

Studies in African Bombyliidae. VI. A provisional classification of the Ethiopian Systropinae with descriptions of new and little known species

by

JOHN BOWDEN

University of Ibadan, Ibadan, Nigeria.

INTRODUCTION

The Systropinae are well represented in Africa whence the type species, *Systropus macilentus* Wiedemann, was described. About thirty species have since been recorded from the continent, the majority of which are to be found described in the works of Bezzi (1924), Enderlein (1926, 1930) and Hesse (1938). Several species not considered by these authors were named by Speiser (1914) and Curran (1927) while additional species have been described by François (1954) and Bowden (1962). Seguy (1934) recorded a second species from Madagascar, Enderlein (1926) being the first to describe a Malagasy species of *Systropus*, although Wandolleck (1897) noted an unnamed species (as *Cephenus*) from Madagascar.

The nomenclatural status of the Ethiopian species is rendered uncertain because of doubt regarding the status of the genera put forward by Enderlein (1926). This author divided *Systropus* into eight genera (including the Neotropical *Pioperna* based upon *Cephenus femoratus* Karsch) of which six were given African type species while African representatives of *Cephenius* Enderlein, with an Oriental generotype, were also described. The Ethiopian fauna is thus, according to Enderlein, referable to no less than seven genera, four (*Coptopelma* and *Diaerops*, *Coptodicrus* and *Symballa*) being differentiated upon one character of one sex, the female. As Hesse (1938) has pointed out, this leads to considerable difficulty with regard to males, a difficulty by no means eased by Enderlein's evident uncertainty over the generic status of some species e.g. *Systropus marshalli* Bezzi occurs in two genera. However, although there are grounds for rejecting some, if not all, of Enderlein's genera as synonymous with *Systropus* s. str. no formal synonymy seems to have been published. Painter and Painter (1963) overstate the case when referring to a detailed generic synonymy provided by Hesse. The latter author made cautious comment on the unsatisfactory nature of Enderlein's division of *Systropus*, retaining all the southern African species in *Systropus* and thereby indirectly relegating *Coptopelma*, *Diaerops*, *Coptodicrus* and *Symballa* to synonymy, since all these genera were based, in whole or in part, upon species allocated by Hesse to *Systropus*. No explicit synonymy was promulgated by Hesse so that the present

rather unsatisfactory position is that four of Enderlein's genera have been made implicitly synonymous with *Systropus* and two more, *Dimelopelma* and *Cephenius*, currently contain African species.

The kindness of several colleagues has enabled me to study material representing most of the known Ethiopian species and the comprehensive descriptions of Hesse (1938) enable the majority of the species not seen to be placed easily in the classification put forward. I have not provided subfamily characterization which has been admirably set out by Hesse (1938) and Painter and Painter (1963), but have drawn attention, in the appropriate context, to various characters which seem to be of value in segregating species and groups. The suggested classification must be regarded as very provisional because of a paradoxical situation regarding material. The Ethiopian fauna is the richest in numbers of species yet the number of individuals known is very small. Few species are known from more than half a dozen specimens and a good many are known from a single specimen of one sex only. Because of the paucity of material and the frequent absence from collections of one sex comparative studies of genitalia [and as Hesse (1938) has shown the female terminalia also provide useful criteria] are not at this stage possible. When such studies can be made it may be expected that relationships will be clarified and anomalies resolved.

It gives me great pleasure to acknowledge the assistance of Mr H. Oldroyd and the authorities of the British Museum (Natural History), London; Dr S. L. Tuxen of the University Zoological Museum, Copenhagen; Dr R. Schumann of the Humboldt Museum, Berlin; Dr F. Keiser of the Naturhistorisches Museum, Basel; Mr B. Stuckenbergs of the Natal Museum, Pietermaritzburg; M. F. François of Brussels and Mr R. H. Carcasson of the National Museum, Nairobi in the provision of material for study, including the types of almost all those species described by European authors. Types of new species described here are in the British Museum (Nat. Hist.) or in my collection, as indicated.

Key to the Ethiopian species of *Systropus* Wiedemann

1. Abdominal petiole two-segmented (segments II, III); face with dense tuft of hair below antennae; conspicuously black-and-yellow species resembling vespid genus <i>Pelopoeus</i>	subgenus Dimelopelma	2
— Abdominal petiole three- or four-segmented (segments II-IV or II-V); face without dense tuft of hair, almost bare or with sparse hair only; species usually not conspicuously black and yellow or if so other characters conform		7
2. Wing with three submarginal cells		3
— Wing with two submarginal cells		4
3. Hind legs black; thorax with only humeral area and propleura yellowish or reddish; antennae with first segment three times as long as second	tessmanni	
— Hind legs conspicuously yellow-banded; thorax more extensively reddish, including teguliform lobes and postalar calli; antennae with first segment twice as long as second	pelopoeus	
4. Fourth abdominal segment (first segment of club) with clear yellow anterior band; usually smaller species with less red on pleura, humeral area and metanotum	5	
— Fourth abdominal segment entirely black; larger species with more red especially on humeral area, pleura and metanotum	6	

5. Sides of mesonotum (notopleura) at most obscurely reddish, teguliform lobe distinctly reddish only posteriorly; West African **bicuspis**

— Sides of mesonotum yellow or reddish yellow; teguliform lobes red; East African, N.E. Congo **rex**

6. Thorax extensively reddish, including most of scutellum, metapleura decidedly reddish but mesonotum without oblique stripe from humeral angle; fourth sternite of abdomen black; East African **trigonalis**

— Thorax less red, scutellum mostly black, metapleura black, mesonotum with oblique reddish or yellowish stripe from humeral angle; fourth sternite largely yellow; West African **tribolus**

7. Wing with alula well developed, lobate; vein Sc bare beneath; propleuron with dense tuft of hair; abdomen attenuate, petiole four-segmented . . . subgenus **Teinopelmus** 8

— Wing with alula greatly reduced, more or less linear; vein Sc hairy beneath; propleuron bare or at most with sparse pubescence; abdomen not markedly attenuate even if laterally compressed in some species, petiole three- or four-segmented . . . 11

8. Wing with two submarginal cells 9

— Wing with three submarginal cells **nandinus**

9. Metasternum black, abdomen predominantly reddish to black 10

— Metasternum entirely yellow, abdomen entirely yellow **buttneri**

10. Thorax with less extensive yellow markings, spots at wing base and on postalar callus small, propleuron and prospiracular area black; pleural pubescence silvery; West African **rugosus**

— Thorax with more extensive yellow markings, spots at wing base and on postalar callus large, conspicuous; propleuron and prospiracular area yellow, pleural pubescence gleaming yellow, that on sternopleuron gleaming white with yellowish reflections; Eastern species, N.E. Congo **rufidulus**

11. Wing, if infuscate, unicolorous, not with broad yellow basal markings and contrasting darker apical colour; ground colour of body black or with prominent black and red or black and yellow pattern; ligament between wing base and scutellum bare, metanotum poorly developed; small to moderately sized species - subgenus **Systropus** 12

— Wing broadly yellow at base and costal area, apex darker, mauve to brownish-black, veins often outlined with darker colour; ground colour of body reddish; ligament between wing base and scutellum hairy, metanotum well developed; large or very large species simulating vespid genus *Belonogaster* - subgenus **Diaerops** **marshalli**

12. Wing with two submarginal cells 13

— Wing with three submarginal cells 35

13. Body conspicuously black and yellow; thorax largely yellow with black markings, wings clear hyaline 14

— Body never conspicuously black and yellow, thorax black with red or yellow markings 15

14. Metasternum with prominent black markings **trispinosus**

— Metasternum entirely yellow **quadrinotatus**

15. Hind femora without spines below 16

— Hind femora with two or three short spines below **macilentus**-group 33

16. Pubescence, especially on first antennal segment and thorax, markedly long and dense, white; first antennal segment entirely white-haired **crudelis**-group 17

— Pubescence not markedly long and dense, rarely entirely white on thorax; first antennal segment at most with some intermixed white hair 21

17. Wing with distinct infuscation, brownish, smoky or greyish with at least costal cell darker and with a distinct cloud over fork of R₄₊₅ 18

— Wing entirely glassy hyaline, at most with a faint cloud over R₄₊₅ **munrot**

18. Propleural area (including prospiracular area, propleural callus and propleuron) and anterior coxae entirely ivory-yellow or yellowish 19

— Propleural area not entirely yellowish, callus between prospiracle and lower propleuron black, propleuron sometimes partly black, anterior coxae reddish 20

19. Pubescence of mesonotum white *hirtulus*

— Pubescence of mesonotum brassy yellow. *limacodidarum*

20. Notopleura continuously reddish, propleuron entirely yellow *eruentatus*

— Notopleura not continuously reddish, propleuron partly black *crudelis*

21. Club of abdomen in apical part (segments VI-VIII or VII-VIII) with conspicuous, dense silvery or white pubescence - *snowi*-group 22

— Club of abdomen in apical part without conspicuous silvery or white pubescence, at most with scattered or sparse silvery or white hair 27

22. First antennal segment largely or entirely reddish; wings relatively longer, wing length : body length ratio 1 : 1.4 to 1 : 1.6 23

— First antennal segment much darker, dark brownish only extreme base paler; wings relatively shorter, wing length : body length ratio 1 : 1.8 *fumosus*

23. Pronotal and humeral hair white; hair on vein Sc white above 24

— Pronotal and humeral hair black; hair on vein Sc black above *rubripes*

24. First antennal segment entirely black-haired 25

— First antennal segment with intermixed black and white hairs 26

25. Thorax with anterior margin of mesonotum and notopleura all red; scutellum partly reddish; anterior coxae reddish, wing less darkly infuscate, only tinged smoky-brownish *snowi*

— Thorax with anterior margin of mesonotum black, notopleura black between humeri and wing bases; scutellum all black; anterior coxae yellowish anteriorly and apically; wing darkly brownish-yellow infuscate *syscius*

26. Fifth abdominal segment entirely or predominantly pale reddish-yellow; propleuron black, only propleural callosity yellow, anterior coxae pale yellowish anteriorly *zuluensis*

— Fifth abdominal segment predominantly black, only an anterior lateral stripe reddish-yellow; propleuron as well as propleural callosity yellow; anterior coxae blackish anteriorly *leucoproctus*

27. Abdomen, especially club, strongly laterally compressed, petiole including anterior half of fifth segment and gradually expanding into club - *hessei*-group 28

— Abdomen rounded, not laterally compressed, petiole distinctly only three-segmented and club well differentiated - *silvestrii*-group 30

28. At least fore tibiae with white pubescence posteriorly 29

— Fore tibiae with dense, short black pubescence posteriorly *rufifemur*

29. Hind tibiae black, first three segments of hind tarsi golden yellow; wing less darkly infuscate without purplish reflections *hessei*

— Hind tibiae in apical halves and first four segments of hind tarsi bright ochraceous-yellow; wing very darkly infuscate with purplish reflections *jactator*

30. Propleuron yellow 31

— Propleuron black 32

31. Humeri and an oblique stripe from humeri yellow; abdominal pubescence black. *silvestrii*

— Humeri blackish, mesonotum without oblique yellow stripe; abdomen with pubescence on sides of club and on venter from segment V golden *diremptus*

32. Humeral callus with slight oblique yellowish stripe extending onto mesonotum; teguliform lobe black; wing lightly infuscate; abdominal club with dense, short black pubescence, opaque; West Africa *sericeus*

- Humerus narrowly yellow without any indication of yellowish dorsal extension; teguliform lobe with distinct yellow median spot; abdominal club with sparser pubescence, hence distinctly more shining; wing dark brownish infuscate; East Africa. **cheiron**
- 33. Propleural callosity, anterior coxae, front and middle tibiae posteriorly, brownish to reddish, without any trace of silvery pubescence on tibiae; metasternum in part black; hind legs pale reddish-brown with apices of femora and tibiae conspicuously darkened 34
- Propleural callosity, anterior coxae, front and middle tibiae posteriorly, ivory-yellow to white, tibiae with faint but distinct silvery pubescence; metasternum entirely reddish; hind legs entirely black **barnardi**
- 34. Antennae, face, notopleura broadly, teguliform lobe entirely, pteropleuron, metapleuron, base of first abdominal segment, abdominal segments II-V above and medially below and legs reddish to reddish-brown **macilentus**
- Antennae, face, most of mesonotum, teguliform lobe at least in part, most of pteropleuron, and meta pleuron, dorsum of abdomen, coxae, anterior and middle femora, apices of anterior and middle tibiae and all tarsi very dark almost black . **namaquensis**
- 35. Hind femora without spines below, abdomen strongly laterally compressed 36
- Hind femora with two or three short spines below, abdomen not compressed 37
- 36. Abdomen predominantly reddish or reddish-yellow, somewhat darkened towards apex; on thorax only humeral calli and upper part of pteropleuron yellowish. **holaspis**
- Abdomen predominantly black, segments of stalk yellowish; thoracic markings more extensive, postalar calli and part of propleuron yellow **leptogaster**
- 37. Fore tibiae with silvery pubescence posteriorly; thoracic and abdominal markings yellow **daveyi**
- Fore tibiae with black pubescence posteriorly; thoracic and abdominal markings red **sanguineus**

Genus *SYSTROPUS* Wiedemann

Subgenus *Dimelopelma* Enderlein, **stat. nov.**

Dimelopelma Enderlein, 1926 : 90, as full genus. Type species, *Dimelopelma tessmanni* Enderlein, 1926.

The original diagnosis given by Enderlein when he erected *Dimelopelma*, as a full genus included two characters only, the presence of three submarginal cells in the wing of the type species and a two-segmented abdominal petiole. The presence of three submarginal cells is not of value above specific level (although within the subfamily it is a character which appears to be exclusively found among African species), but the two-segmented abdominal petiole is a quite unusual formation which, with other well defined characters, enables *Dimelopelma* to be differentiated as a well marked subgenus.

The characters uniting the six species now known, including three described here as new, are: abdomen with two-segmented petiole comprised of second and third segments and sharply differentiated from broad club; face with a dense tuft of black hair below antennae; wing with two or three submarginal cells, sometimes with a yellowish anterior or basal suffusion but predominantly hyaline; hind femora without spines; conspicuously black-and-yellow species bearing a marked resemblance to wasps of the genus *Pelopoeus*.

The subgenus is exclusively equatorial in distribution (fig. 1) and dominantly one of moist, forested areas. One species, *rex* Curran, occurs in a savanna situation but even here the known localities are in wooded parkland savanna.

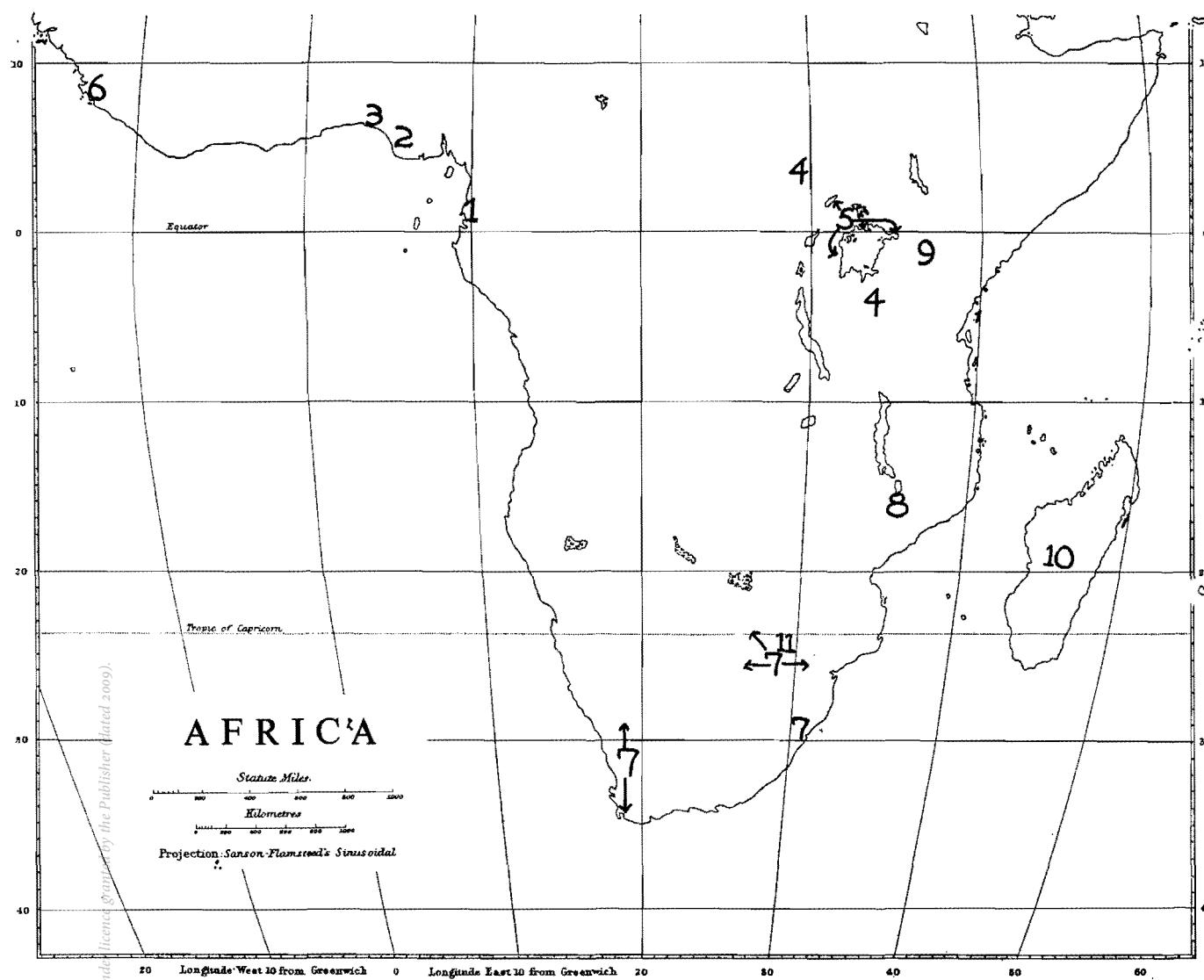


Fig. 1. Distribution of *Systropus* species: 1. *tessmanni*; 2. *pelopoeus*; 3. *bicuspid*; 4. *rex*; 5. *tri-gonalis*; 6. *tribolus*; 7. *crudelis*; 8. *hirtulus*; 9. *cruentatus*; 10. *madagascariensis*; 11. *munroi*.

Systropus (Dimelopelma) tessmanni Enderlein, **comb. nov.***Dimelopelma tessmanni* Enderlein, 1926 : 90, fig. 1.

This species has not been recorded since its original, brief description. The following redescription is provided of this interesting species.

MALE: *Head:* occiput black, densely white pollinose with sparse black hair; ocellar tubercle reddish; eyes separated by matt black stripe of half width of anterior ocellus, upper anterior facets enlarged; face and frons clear pale yellow, upper part of frons fuscous, middle of face and buccal cavity brownish, frons lightly silvery pollinose, genae densely and broadly so, facial hair tuft yellowish; antennal tubercle pale ivory yellow; antennae about 4.5 mm long, segmental proportions 3.4 : 1 : 3.3, pale ivory-yellow at base of first segment shading gradually to brown at apex of first, second and third black, first and second black-haired; third broadly lanceolate narrowing evenly to blunt apex; proboscis black, stylets and inner surfaces of labellae bright yellow, palpi yellowish-brown with brown hair. *Thorax* black, pronotum and humeral angles yellow, a short oblique stripe onto mesonotum from humerus reddish, teguliform lobe vaguely reddish medially, postalar calli red, area surrounding prospiracle yellow, propleuron otherwise entirely reddish, sterno- and hypopleuron reddish, former blackened medially, a large reddish yellow stigma overlapping ptero- and metapleuron, former somewhat reddish, wing base area reddish, central cleft of metasternum brownish-yellow; pubescence short, sparse, black; scutellum black, strigulae* dusky yellow, foliate. *Abdomen* black, extreme base of I reddish densely white pollinose, sides and venter of II-III yellow, each with narrow black side stripe not reaching posterior margins; reflexed edges of other segments rather reddish; pubescence black, that on sides of II-III yellow; genitalia yellow, processes of telomeres long and narrow, processes of last sternite (tergite) long and narrow, strongly curved, black apically. *Legs* with first four coxae reddish, darkened anteriorly, hind pair reddish-black; legs otherwise rather uniformly yellow-brown, fore femora more reddish, fore and mid tibiae clear yellow behind; tarsi blackish at bases of metatarsi to black on apical segments, metatarsi of fore and middle legs yellow behind; pubescence black, that behind on tibiae and metatarsi of fore and mid legs yellow, spines of hind tibiae short, 4: 5: 6; claws black, pulvilli large, yellowish. *Wing* with three submarginal cells, smoky hyaline but distinctly yellowish at base, along costal margin to about level of r-m and extending over discal cell and both basal cells, posterior part of first basal cell clear; veins brownish-black, R₄ perpendicular; haltere largely black, base of stem bright ochraceous-yellow, apical half of knob clear sulphur-yellow.

Length of body 17 mm, of wing 12 mm, of proboscis 5 mm.

Redescribed from ♂-holotype, in good condition., SPANISH GUINEA: Makomo, Alcu-Benito District, 1-15.X.1960, G. Tessman, Humboldt Museum, Berlin.

* strigulae = foliate scutellar callosities of Hesse (1938); see Painter and Painter (1963)

This is a very distinctive species and easily recognizable by its unusual combination, for the subgenus, of uniformly coloured legs and conspicuous thoracic markings; further distinguishing characters are the presence of three submarginal cells and greatly reduced yellow marking on the abdomen. It may be noted that Enderlein's description is misleading, especially regarding the hind legs, where the dense covering of black spicules obscures the much paler ground colour, giving the legs a very dark, almost black, appearance.

Systropus (Dimelopelma) pelopoeus spec. nov.

Close to *S. tessmanni*. *Head*: occiput black, lightly grey pollinose, black-haired; ocellar tubercle reddish; eyes closely contiguous for some distance; frons dull black, silvery pollinose; antennal tubercle dirty yellowish; face brownish-yellow, hair tuft dense, long; genae ivory-yellowish, silvery pollinose; antennae 5 to 5.5 mm long, segmental proportions 2.2 : 1 : 2.0, first segment reddish, black apically, second and third black, antennal pubescence all black; proboscis black, reddish below at base, palpi yellowish. *Thorax* predominantly black; humeral calli yellow narrowly surrounded by reddish, this area joined by an obscurely reddish notopleural stripe to red teguliform lobes; postalar calli yellow, middle and posterior margin of mesonotum reddish; pleura with prospiracle black surrounded by ivory-yellow, propleura yellowish-red, a broad reddish stripe from mid coxae to metapleura, lower parts of hypopleura obscurely reddish; scutellum red at basal corners and obscurely so along margin, strigulae dirty brown; thoracic pubescence black, short and sparse, paired admedian stripes of greyish hair on anterior half of mesonotum, some silvery hair on pleura, sternopleural tuft blackish, mesonotum rugose, sparsely punctate, rather dull; scutellum, hypopleuron and metasternum rugose. *Abdomen* with usual pattern of subgenus i.e. I black, II and III yellow with black dorsal triangular marks, narrow and rounded at posterior angles the apices just short of anterior segmental margins; a narrow reddish yellow anterior ring on IV, abdomen otherwise black; pubescence black except for yellow gleaming hair on yellow areas of II and III; subgenital plate of female large, shining black, produced into paired, stout, bluntly rounded points. *Legs* with all coxae reddish; anterior and middle legs with femora, tibiae and basal segment of tarsi blackish anterodorsally, somewhat darker in male, yellowish to clear ivory-yellow posteriorly, last four segments of tarsi black; hind legs with femora black with a broad yellow pre-apical ring, hind tibiae black with broad yellow ring commencing at about middle of tibiae to beyond three-quarter mark; callus of fore femora dirty yellowish; claws black; pulvilli dingy white. *Wings* with three submarginal cells; hyaline with well marked anterior pattern: base and costal margin as far as vein m , extending beyond $r-m$ cross-vein, yellowish, distal part from about base of $R2+3$ more deeply stained brownish, a slight yellow suffusion sometimes present in bases of discal and third posterior cells, second basal cell sometimes outlined yellowish or with proximal half yellowish; veins brown, yellowish basally, first posterior cell slightly narrowed at apex; squama blackish with white fringe, haltere with stem and base of knob blackish, apical half of knob clear ivory-yellow.

Length of body 15.0-15.5 mm, of wing 12.0-12.5 mm, of proboscis 4 mm.

♀-Holotype: NIGERIA: Benin "*Elais guineensis*", (E. L. 10. par. 1), 1953,

G. H. Caswell, Brit. Mus. (Nat. Hist.); 1 ♂, 2 ♀-paratypes, same data as holotype.

A distinct species agreeing with *S. tessmanni* in possessing three submarginal cells, these two species thus differing from the four others in the subgenus, but differing from Enderlein's species in the relatively shorter first antennal segment and the black and yellow banded hind legs. *S. pelopoeus* is the species referred to by Allen and Bull (1954) as *Systropus* species nr. *tessmanni*, parasitizing 6% of the cocoons of *Parasa* species nr. *serratilinea* B.B., a pest of oil palms in Nigeria.

Systropus (Dimelopelma) bicuspis Bezzi

Systropus bicuspis Bezzi, 1924 : 126, 93.

Described from a solitary female, the male has hitherto been unknown. It differs from the female as follows: eyes separated by a narrow, dusky interocular stripe; frontal triangle yellow, face brownish, hair tuft black; antennal proportions 2.8 : 1 : 2.0; thorax extensively reddish, humeri yellow, but humeral angle reddish; notopleura narrowly, anterior half of teguliform lobes, postalar calli, propleuron in part, a prominent stripe from metapleuron to mid coxae and anterior part of hypopleuron, all reddish, a reddish smudge on sides of metasternum. *Hypopygium* very similar to that of *S. rex* Curran (Bowden 1962, fig. 1-3) but processes of last sternite much less heavily sclerotized and less deeply curved.

Described from a male, NIGERIA: Shagamu, "No. 18L. 1, Ex. 58" bred from limacodid larva, 18. IV. 1920, A. W. J. Pomeroy, in Brit. Mus. (Nat. Hist.). Also in the British Museum are two further females, NIGERIA, A. W. J. Pomeroy, no other data, which although badly damaged are undoubtedly *S. bicuspis**.

Bezzi recorded this species as having been bred from the mutillid *Stenomutilla beroe*. There is, however, no evidence to support this claim. There is a specimen of *Stenomutilla beroe* in the British Museum with collection data exactly similar to that of the holotype of *Systropus bicuspis* but there is nothing on either set of labels to indicate anything other than coincidental collection. The evidence of Dr Neale, which Bezzi quoted, for the rearing of *S. bicuspis* from the mutillid must, if accurate, be additional to that which can be derived from the labels attached to the holotype of *S. bicuspis*. The record quoted above for the Shagamu male ** suggests that the species parasitizes Limacodidae.

*) Bearing the same data as these females are an empty pupal case of a *Systropus* and an empty limacodid cocoon.

**) and the *Systropus* pupa and limacodid cocoon associated with the two additional females.

Systropus (Dimelopelma) rex Curran

Systropus rex Curran, 1927 : 42, fig. 2; Bowden, 1962 : 51, 6, figs. 1-3.

Described from Garamba, N.E. Congo, and subsequently recorded again from Garamba in material of the Mission H. de Saeger.

I have also seen ex Brit. Mus. (Nat. Hist.) both sexes from TANGANYIKA: Old Shinyanga, E. Burtt, series reared in 1947 and 1948 from *Parasa vivida* Wlk. on Tecoma and from *Coenobasis amoena* Fld. on Acacia spirocarpa; and, ex Coryndon Museum, Nairobi, ♂♀ in cop., Old Shinyanga, 10.IV. 1954, E. Burtt. The female of this pair bears a label "Bombyliidae, *Systropus bicuspis* Bezzi, Reared from *Parasa vivida* on a previous occasion."

S. bicuspis and *S. rex* form a very closely allied east-west species pair similar to that of the next two species. It has recently been suggested (Bowden, 1962) that *S. rex* may also parasitize a mutillid. This claim was based upon the elementary mistake of confusing multiple parasitism, involving in this case a *Systropus* and a mutillid, with hyperparasitism. There is, in fact, no substantiated evidence to suggest that either *S. bicuspis* or *S. rex* depart from the apparently universal habit of Systropinae of parasitizing Limacodidae.

Systropus (Dimelopelma) trigonalis Bezzi

Systropus trigonalis Bezzi, 1924: 127, 94.

The original description of this species is rather less than adequate, too much being assumed from a comparison with *S. bicuspis*. The following description has been drawn up from the original type series and numerous other specimens from Kenya and Uganda.

Head: occiput black, yellowish near foramen, clothed with dense silvery pollen and long, sparse black hair; ocellar tubercle reddish-brown; eyes separated by about or slightly less than width of anterior ocellus, upper anterior facets enlarged in both sexes; interocular stripe matt black, frontal triangle yellowish with dull grey pollen and short black hair; face, genae and buccal margins dull yellowish, face with usual prominent black hair tuft, genae silvery pollinose; antennal tubercle yellow, antennae 5 to 5.5 mm long, proportions 2.8 : 1 : 2.0-2.5, first segment yellowish to yellowish-brown, second yellowish-brown to brown, both black-haired, third black, flat, lamellate, broadly rounded apically; proboscis black, yellowish below at base, palpi yellow. **Thorax** predominantly reddish or reddish-yellow; mesonotum (excluding humeri, notopleura, teguliform lobes and postalar calli) black, mesopleura, upper parts of hypopleura and metasternum black, latter with large pale patch just above hind coxae; pubescence short, sparse, almost entirely black some pale hairs across posterior margin of mesonotum, on postalar calli and on lower hypopleura; scutellum red with light blackish \wedge -shaped basal pattern, black-haired with some yellowish hair around margin, strigulae reddish-black. **Abdomen** with usual pattern; predominantly black, II-III bright yellow with dorsal triangular black markings with bases on

posterior margins, apices not reaching anterior margins, III also with a narrow black lateral stripe; IV without or with a very narrow pale yellowish anterior band; club sometimes obscurely reddish over black ground; pubescence predominantly black, that on club dense, that on yellow parts of petiole yellowish. *Legs*: coxae reddish yellow, hind pair darkest; fore and middle legs predominantly yellowish, last four segments of each tarsus black but reddish ventrally, femora and tibiae with rather dense short black pubescence that of tibiae on anterior faces, posterior faces of tibiae with inconspicuous white pubescence; hind femora dark brownish with broad pre-apical yellow ring, the brown areas so densely covered with black spicules as to appear black, spicules on yellow ring yellow; hind tibiae dark brownish with broad median yellow ring, brown areas also very densely clothed with black spicules and thus appearing black; first segment of hind tarsus yellow except for extreme base and apex which are black, other segments black; spines of hind tibiae 5 : 5 : 5 or 6 : 6 : 6; all claws black, pulvilli yellowish. *Wing* subhyaline, pale yellowish basally and in costal cell; *r-m* well beyond middle of discal cell, apical cross vein of latter long, slightly S-shaped, *R*4 strongly bent at base and sometimes with an appendix, first posterior cell narrowed at apex; squama dirty yellowish, haltere with brownish stem and yellow knob.

Length of body 18-20 mm, of wing 12-14 mm, of proboscis 4 mm.

Redescribed from type series and other material from: KENYA: Kakamega, 1914, S. A. Neave; Yala River, southern edge of Kakamega Forest, 4,800'-5,300', 21-28.V. 1914, S. A. Neave. TANGANYIKA: Bukoba, 9-11.VI. 1912, G. C. Gowdey. UGANDA: near Hoima, 6.XII. 1911, S. A. Neave; North of Lake Isolt, 3,700', 4-6.I. 1912, S. A. Neave; Entebbe, 6-31.V. 1912, G. C. Gowdey; Kampala, 4.IV. 1935, H. Hargreaves; Kampala, 26.III. 1935, ex *Latoia viridicosta* Hmps., G. E. H. Hopkins.

A large species, widely distributed in the area around Lake Victoria, *S. trigonalis* is distinguished by the extensively reddish thorax. It forms, with the closely allied species following, a link between the large *S. tessmanni* and *S. pelopoeus* with three submarginal cells, and the smaller, less robust *S. bicuspis* and *S. rex* with two submarginal cells. The recorded host, *Latoia viridicosta*, is a handsome limacodid not uncommon around Kampala.

***Systropus (Dimelopelma) tribolus* spec. nov.**

Very close to *S. trigonalis* differing as follows: *head* with eyes in male more closely apposed, separated by a narrow strip distinctly less than width of anterior ocellus; antennal proportions 3.0 : 1 : 2.6. *Thorax* less extensively reddish, mesonotum not broadly reddish on anterior margin but with a yellow or reddish-yellow oblique stripe extending from humeri well onto mesonotum, notopleura and metanotum black, metasternum and scutellum largely blackish, strigulae clear yellow. *Abdomen* with sternite IV largely yellow, the black dorsal markings of II-III tending to be shorter, their apices further from anterior margins. *Legs* and *wing* similar to *trigonalis* but vein *R*4 without appendix not so sharply angled.

Length of body 18-20 mm, of wing 12.5-14.0 mm, of proboscis 4 mm.

♂-holotype: SIERRA LEONE: Bonthe, ex "Yagoi", 26.VI. 1950, F. A. Squire; Brit. Mus. (Nat. Hist.); 1 ♂, 3 ♀-paratypes, same data as holotype.

This species is the West African representative of *trigonalis*. The resemblance between this species pair is very much closer than that between the other east-west pair, *bicuspis* and *rex*, but I have accorded *tribolus* specific status. It has not been possible to identify from the vernacular "Yagoi" the host of *tribolus*, which is presumably a limacodid but which may not be the same species as the host, or hosts, of *trigonalis*. Insufficient is yet known of the biology of the Systropinae and material available is generally too inadequate to determine with any precision what constitutes two subspecies as opposed to two closely allied allopatric species.

Teinopelmus subgen. nov.

This subgenus is erected for four aberrant species and may be defined as follows:

Body fragile, slender and elongate, abdomen laterally compressed, petiole composed of four segments (II-V), club feebly differentiated from petiole; palps with long (about half length of palp) hair; thorax with moderately dense pubescence, propleuron with dense tuft of hair, thorax including pleura to sternopleuron strongly rugose and punctate; legs long and slender, covering of spicules less dense than in other groups; wing clear hyaline, microtrichiae comparatively long and fine but absent from extensive areas in basal parts of wing, vein Sc bare or only sparsely hairy beneath, with a well developed, lobate alula.

Type of subgenus: *Systropus rugosus* Bezzii, 1924.

The presence of a well developed alula (which may be so completely hyaline that it can be difficult to see) immediately differentiates this subgenus from all other groups within the subfamily. The propleural tuft is also exceptional; pleural tufts, when present, are in other groups on the meso- or pteropleuron. In all other Ethiopian and Oriental species which I have seen the subcostal vein is notably hairy on both dorsal and ventral surfaces and where the mesonotum is markedly rugose and/or punctate the pleura, in particular the lower pleura, are considerably less so or even virtually smooth. In *Teinopelmus* the lower surface of the subcosta is completely bare in three species (except for a very fine short pubescence) and with only fine sparse hair in the fourth (*nandinus*) and in all four the reticulations are remarkably prominent even on the most ventral parts of the pleura.

The subgenus is equatorial in distribution (fig. 2). The four species while united by the morphological characters noted above, have developed widely differing colour patterns which parallel those of three distinct groups of species within *Systropus* s. str.

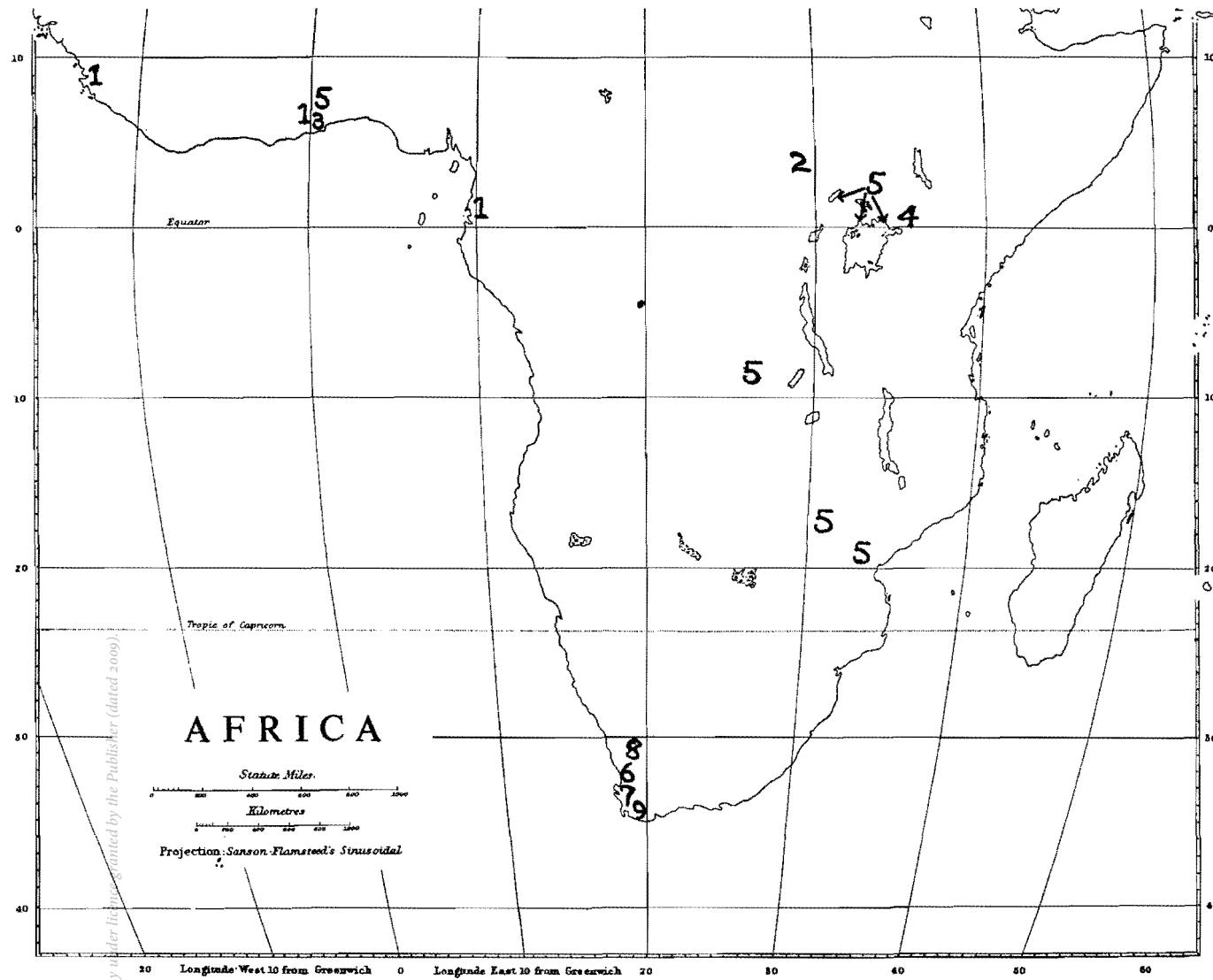


Fig. 2. Distribution of *Systropus* species: 1. *rugosus*; 2. *rufidulus*; 3. *buttneri*; 4. *nandinus*; 5. *marshalli*; 6. *macilentus*; 7. *barnardi*; 8. *namaquensis*; 9. *sanguineus*.

Systropus (Teinopelmus) rugosus Bezzi

Systropus rugosus Bezzi, 1924 : 123, 91, fig. 9; Bowden, 1964 : 52.

Cephenius tenuis Enderlein, 1926 : 87, **syn. nov.**

This species was well described by Bezzi, who also figured the wing with the alula also shown. The only discernible differences between the holotype of Enderlein's species *tenuis* and specimens of *rugosus* from Ghana, including Bezzi's type series, are that the long hairs at sides of first abdominal segment are pale in *tenuis* and yellow-ochraceous to yellowish in Ghana *rugosus* and that in *tenuis* the abdomen is a clearer red, even reddish-yellow on the reflexed edges of the last three segments. This difference in intensity of red and yellow coloration between specimens from various parts of the West-African Congo forest belt is not uncommon in the Bombyliidae e.g. *Petrorossia gratiosa* Bezzi (Bowden, 1964).

Previously known from two localities in the forest zone of Ghana I have also seen specimens from GHANA: Aburi 1912-1913, W. H. Patterson, (Aburi is at the southern limit of the forest zone) and Tafo, 1951-1953, H. R. Mapother, plus a very old specimen from SIERRA LEONE (Morgan - no further data) which may be the basis of Walker's (1849) record of *macilentus* from Sierra Leone. *S. rugosus*, which as noted by Bezzi bears a marked resemblance to some species of *Ammophila*, is thus widely distributed through the West African forest zone, *tenuis* having been described from Spanish Guinea.

Systropus (Teinopelmus) rufidulus Bowden

Systropus rufidulus Bowden, 1962 : 50, 5.

Known from a single male, Garamba National Park, N.E. Congo. *S. rufidulus* is the eastern representative of *rugosus*, inhabiting fairly open savanna woodland and differing as indicated in the key to the species.

Systropus (Teinopelmus) buttneri Enderlein, **comb. nov.**

Cephenius buttneri Enderlein, 1926 : 87.

No specimen other than the type is known. The holotype is a female, not a male as stated by Enderlein, in not very good condition, dirty, with some fungus, left antenna and right hind leg missing, wings crumpled and broken at apices. The following redescription should enable the species to be recognized.

Head: occiput black, pale yellow ventrally, densely white pollinose and with very short pale pubescence; ocellar tubercle small, yellowish; eyes contiguous for distance about twice length of second antennal segment, anterior facets slightly enlarged; frons slightly brownish in upper angle, otherwise frons, face, genae, buccal cavity and head beneath pale yellow, frons and genae densely silvery pollinose, facial tuft short, sparse, white; antennal tubercle very pale yellow, antenna with first segment pale bone-coloured, almost white, second and

third segments black, first and second with longish, rather sparse black hair, third rather narrow blade-shaped, slightly pointed at apex, segmental proportions 5.1 : 1 : 2.9, total length about 5 mm; proboscis short, broadly yellow below and coarsely spiculate, palpi yellowish. *Thorax*: mesonotum deeply rugose and punctate, shining black; humeral angle pale transparent yellow, a broad rounded patch from humerus onto mesonotum, a more or less triangular area on anterior part of teguliform lobe, margin between mesonotum and posterior part of teguliform lobe and also postalar callus, ivory-yellow; pleura pale yellow, mesopleuron, metapleuron, lower part of pteropleuron and adjoining upper sternopleuron dull black, a black area on lower hypopleuron above hind coxa, metasternum entirely pale yellow; pubescence of mesonotum short, sparse, pale, that on pleura long, moderately dense, shining white, a patch of brown hair in upper anterior corner of mesopleuron; scutellum black at base, broadly pale yellow at apex, black-haired medially, sides and apical margin with white hair, strigulae pale yellow. *Abdomen* (distorted), long, narrow, petiole of II-IV at least, club poorly differentiated with posterior part of V gradually expanding into VI; entirely light ochraceous yellow, a brownish median stripe extending full length of dorsum, pubescence pale golden, that on brown stripe brown, these brown hairs expanding into a broad triangular area at sides of VII; ovipositor very short, blunt, with rather long, fine brownish hair. *Legs* with anterior coxae yellow, others blackish-brown with yellow apices; legs largely pale yellow, hind femur lightly brownish above, fore and mid metatarsi pale ivory, other tarsal segments of fore and mid legs brownish to black, hind tarsus gradually darkening from pale brown on metatarsus to black on last segment; pubescence on fore and mid tibiae white, dense and shining behind, fore metatarsus with longish golden hair below, hind femur above and hind tibia with dense brown spicules darkening apparent colour, hind femur without spines, those on hind tibia short, arranged 5 : 6 : 7; claws black, pulvilli yellowish. *Wing* hyaline with well developed absolutely hyaline alula; R4 gently curved, first posterior cell widely open, microtrichiae absent from wing base and parts of basal, costal and axillary cells; squama yellowish with pale fringe, haltere with brown stem, knob large, brownish-black with ivory-yellow spot basally below.

Length of body (allowing for distortion) about 16-17 mm, of wing 9-10 mm, of proboscis 3 mm.

♀-holotype: Togo: Bismarckburg, October 1891, R. Buttner. This locality is now in Ghana, not as stated by Bowden (1964) in the Togo Republic.

The salient characters of this species are completely consonant with those of *rugosus* - slender, long-petioled abdomen, heavily rugose and punctate mesonotum, dense, shining white pleural pubescence tufted on propleuron, wing with alula, Sc bare below. However, *buttneri* has developed a very extensive yellow body colour akin to that found in *trispinosus* and *quadrinotatus* among Ethiopian species and to that of several Oriental species and is thus of considerable interest as an indicator of relationships within other groups.

Systropus (Teinopelmus) nandinus spec. nov.

Systropus leptogaster Loew, *sensu* Bezzi *nec* Loew, Bezz, 1924 : 121, 90, in part and fig. 8.

MALE: *Head:* occiput black, with pale hair; eyes contiguous for distance distinctly less than twice length of ocellar tubercle; frons blackish in upper part, lower frons, face, genae and head beneath ivory-yellow, genae silvery pollinose; antenna (third segment absent) black-haired, first segment 2.5 times length of second; proboscis black. *Thorax* with mesonotum and lower pleura heavily rugose and punctate; black, only point of humerus and propleuron clear ivory-yellow; pubescence white, long on pleura, a small tuft present on propleuron; scutellum black, strigulae yellow. *Abdomen* with petiole II-V; black, III somewhat reddish yellow on sides posteriorly, IV and V reddish-yellow, darkened in mid line above; pubescence black, that on I more brownish-black except for some white hair ventrally, a narrow band of gleaming sericeous-white hair across posterior margin of petiolar segments II-V. *Legs:* coxa black, first pair dingy pale yellowish anteriorly at apices, fore leg mainly yellow, second to fifth tarsal segments black, white hair posteriorly on tibia, femoral callus yellow, minutely hairy; mid leg with femur black, tibia yellow appearing black anteriorly because of dense black spicules, metatarsus yellow with black apex, tarsus otherwise black; hind leg yellow except for last three tarsal segments, femur, tibia and first two tarsal segments appearing darker above because of dense, black spicules; all claws black, pulvilli dingy yellowish-white. *Wing* opaquely hyaline with faint yellow infuscation in costal cell; alula well developed, subhyaline; with three submarginal cells, first widely open (i.e. R₂₊₃ and R₄ diverging), first posterior cell broadly open; veins brown; squama pale yellowish, white-fringed, haltere with blackish stem and clear ivory knob.

Length of body 12.5 mm, of wing 7.0-7.5 mm, of proboscis about 3.5 mm.

♂-holotype: KENYA (British East Africa): Nandi Plateau, 30.V-4.VI.1911, S. A. Neave, Brit. Mus. (Nat. Hist.).

♂-paratype: same data as holotype.

Both specimens of *nandinus* had been misidentified as *leptogaster* Loew. The holotype bears an identification label of Paramonow, the paratype was listed as an undersized *leptogaster* by Bezz. The latter specimen is minus the abdominal club but is evidently the one selected for the illustration of the wing of *leptogaster* in Bezz (1924 fig. 8) since the illustration clearly shows a lobate alula. There is a remarkable resemblance to *leptogaster* but *nandinus* is undoubtedly related to *rugosus* since its main morphological features are all those of the subgenus *Teinopelmus*. It is of interest because, with three submarginal cells, it illustrates the uselessness of the number of these cells as a generic character in the Systropinae and because it exhibits one extreme of body colour, black with very little yellow or red ornament, which has developed in the subfamily. As with *buttneri*, it is an important clue to the development of body patterns and thus to the relations of other species.

Subgenus *Diaerops* Enderlein, **stat. nov.**

Diaerops Enderlein, 1926 : 70. As full genus, type species *Systropus marshalli* Bezzi, 1924.

Coptodicrus Enderlein, 1926 : 91 (in part). As full genus, type species *Coptodicrus vespiformis* Enderlein, **syn. nov.**

Diaerops was erected for *marshalli* Bezzi but was not defined other than by placement in a key to genera and citation of type species. *Coptodicrus* was established, in the same paper, with type *vespiformis* Enderlein and three other species. The latter "genus" appears in Enderlein's key to genera in couplet 6 following *Diaerops* in couplet 4, the sole difference between the genera being a very doubtful venational character, the supposedly different relation between R3 and R4 or R4+5. *Coptodicrus* was further defined on page 91, very briefly, and was there stated also to include *clavatus* Karsch, *marshalli* Bezzi and *sanguineus* Bezzi. *S. marshalli* was thus allocated to two genera by Enderlein himself. Comparison of the descriptions of *marshalli* and *vespiformis* is enough to show that they must be closely allied and they are in fact the same species, *marshalli*. The completely spurious generic distinctions introduced by Enderlein have resulted in quite unnecessary confusion and synonymy.

However, the body form, colour of body and wing pattern are quite unlike those of any other species of *Systropus* and are sufficiently characteristic, when combined with other features, to merit the separation of *marshalli* into a monotypic subgenus for which *Diaerops*, being the first of the two names used by Enderlein, is retained.

The subgenus may be defined as follows: body of large or very large size, of generally reddish-brown ground colour; frons of female with more or less distinct, depressed callus area; metanotum more prominently developed than in other species, scutellum thus widely separate from first abdominal segment; abdominal petiole three-segmented (II-IV), petiolar segments long and thick, club well differentiated, rounded; ligament between wing base and scutellum hairy; wing with three submarginal cells and a characteristic pattern of yellow base and costal border with contrastingly dark apex; simulating wasps of the genus *Belonogaster*. Type of subgenus *Systropus marshalli* Bezzi.

The long, stout petiolar segments, the well developed metanotum plus a rather prominent pronotum possibly suggest that *Diaerops* is a primitive subgenus. Only one species is known, extending from Central Africa to East Africa and across to the West Coast (fig. 2); *clavatus* Karsch and *sanguineus* Bezzi, included in *Coptodicrus* by Enderlein, are in no way related to *Diaerops* and must be excluded.

Systropus (Diaerops) marshalli Bezzi

Systropus marshalli Bezzi, 1924 : 118, 88; Hesse, 1938 : 1026.

Diaerops marshalli (Bezzi), Enderlein, 1926 : 70.

Coptodicrus marshalli (Bezzi), Enderlein, 1926 : 91.

Coptodicrus vespiformis Enderlein, 1926 : 70 and 91, **syn. nov.**

Coptodicerus vespiformis was described from three specimens, all said to be males, of which two were from West Africa and one from Uganda. The two West African specimens are male and female, that from Uganda a male. All are in reasonable to good condition and I have designated, and labelled accordingly, the West African male specimen as lectotype of *C. vespiformis*; the other specimens have been labelled as paralectotypes.

The species is excellently described by Bezzi (1924) and Hesse (1938), and cannot be confused with any other Ethiopian species. I can find no satisfactory basis on which to maintain *vespiformis* as a good species. The West African pair are very much larger than any other specimen I have seen, and there are other minor differences from eastern specimens such as: mesonotum decidedly more pollinose, with distinctly greyish appearance; frontal callus of female less prominent, more nearly the brownish colour of the frons, elongate pear-shaped rather than heart-shaped as in eastern females; callus of fore femur more marked off, a distinct delimiting groove present at either end; in male telomere with somewhat more hooked apex and sclerotized areas of last sternite somewhat more elongate, narrower. There is considerable variation in the amount of darkening of the body; a pair from Entebbe, Uganda, are very much blacker on the abdominal club than any others, the female type and Enderlein's West African pair being generally equally light in colour. The intensity of wing infuscation is also variable, in the West African pair being quite intense, but no more so than the Entebbe pair, compared with the more lightly infuscate wing of the type and other eastern specimens.

Described from Salisbury, S. Rhodesia (female holotype) and Katanga, and recorded again from Rhodesia by Hesse, I have also seen: ♀, KENYA (British East Africa): Yala River, Southern edge of Kakamega Forest, 4,800'-5,300', 21-28.V. 1911, S. A. Neave; ♂♀ in cop., UGANDA: Ddowe, Kampala, May 1952 E. Pinhey; ♂, Jaito, Hoima, 5.VIII. 1911, Nagele (paralectotype, *C. vespiformis*); ♂, GHANA: (Togo), Bismarckburg, 20.VII-20.IX. 1890, R. Buttner (lectotype, *C. vespiformis*); ♀, Togo: Hinterland, 10.IX. 1889, Kling, (paralectotype, *C. vespiformis*).

The Kenya female exhibits some venational abnormalities. In the right wing a supernumerary cell is cut off at base of second submarginal cell and another at extreme apex of anal cell while there are two small appendices on R4, beyond the bend, projecting into third submarginal cell. In the left wing supernumerary cells are cut off one at apex of costal cell and one at base of first submarginal cell while there is an appendix at bend of R4 projecting into third submarginal cell and another appendix on M3 projecting into discal cell just before apex of latter. I have not seen venational instability in any other specimen of *Systropus* which I have examined.

S. marshalli was bred from cocoons of the limacodid *Parasa urda*, a widely distributed African species, at Elizabethville (Labo) by Seydel (1935). This author notes that 65 specimens of *marshalli* were reared from 100 host cocoons, only 9 adults of the moth emerging.

Subgenus *Systropus* Wiedemann

Systropus Wiedemann, 1820, 1828; Bezz, 1924 : 116; Enderlein, 1926 : 70; Engel, 1937 : 85; Hesse, 1938 : 1012; Painter and Painter, 1963 : 284.

Coptopelma Enderlein, 1926 : 70, **syn. nov.**

Coptodicus Enderlein, 1926 : 70 and 91 (in part), **syn. nov.**

Symballa Enderlein, 1926 : 70 and 92, **syn. nov.**

Cephenius Enderlein, 1926 : 70, **syn. nov.**

After removing the species of the subgenera *Dimelopelma*, *Teinopelma* and *Diaerops* a diverse assemblage remains which for the present is left within the nominate subgenus. Various more or less distinct groups are recognizable; these have been indicated in the key and are dealt with as species groups in the following pages. However, there are one or two species which cannot be satisfactorily allocated to any group because of the difficulty in deciding on the relationships indicated by five main characters and the degree to which each may be polyphyletic. These characters are: the presence of three submarginal cells in the wing; the development of dense, silvery or white pubescence on the fore, or fore and mid, legs; the presence of spines on hind femora; the form of the abdomen, whether rounded or laterally compressed; and the colour pattern. There is considerable overlap between these characters and, as noted previously, genitalic characters cannot provide much help, at this stage, in resolving difficulties. However, it seems clear from the evidence provided by the subgenera *Dimelopelma* and *Teinopelma* that the development of three submarginal cells can be of no more than specific importance and, from *Teinopelma*, that closely allied species can develop opposite extremes of body colour. The latter is commented on further below, but it seems clear that neither of the characters just discussed can carry much weight in indicating relationships between species or groups.

It has been remarked that there is some uncertainty over the status of Enderlein's genera. Although nearly all are based on spurious distinctions and some on misidentifications, no formal synonymy appears to have been published. Three of Enderlein's genera have been considered in the preceding pages; for the remainder formal synonymy with *Systropus* *s. str.* is now established.

Coptopelma Enderlein was based upon *C. schineri* Enderlein, a *nomen novum* for *Systropus macilentus* Wied. *sensu* Schiner 1868, *nec* Wiedemann. As will be shown below, *schineri* Enderlein = *sanguineus* Bezz. The latter species, apart from having three submarginal cells in the wing, does not differ in any significant way from *macilentus* itself. Since the character of three submarginal cells cannot be maintained as more than a specific criterion, *Coptopelma* falls to *Systropus* *s. str.*

The genus *Coptodicus* originally included *clavatus* Karsch and *sanguineus* Bezz. These species are dealt with below, are true *Systropus* and the third species of *Coptodicus*, the generotype *vespiformis*, has already been synonymized with *S. (D.) marshalli* Bezz.

Symballa Enderlein was erected for *Systropus leptogaster* Loew *sensu* Enderlein, 1926, *nec* Loew. This is shown later to be the same as *holaspis* Speiser. The latter is related to *hessei* François and a small group of species which cannot be

generically separated from *Systropus* s. str. but if *hessei* and its relatives were to be removed from *Systropus* s. str. they should be placed in *Cephenius*.

The last of Enderlein's genera to have African connections is *Cephenius*, of which the type species is the eastern Oriental *Systropus studyi* Enderlein, 1926. Nomenclatorially *Cephenius* must be distinguished from *Cephenus* Berthold, 1827 (= *Cephenes* Latreille, 1829). Enderlein was incorrect in attributing *Cephenus* to Latreille, 1825; the latter date refers to the vernacular Céphène, latinized to *Cephenus* by Berthold in 1827). Enderlein's genus, although its name was stated to allude to *Cephenus*, is quite separate from the nineteenth century genus, the synonymy of which was established many years ago (e.g. Bezzi, 1905; Kertesz, 1909). *Cephenius* was diagnosed as possessing two submarginal cells and the eyes in both sexes contiguous. The latter was the only character separating *Cephenius* from *Systropus*, which was restricted to those species with two submarginal cells and with separated eyes in both sexes, type species *macilentus* Wied. (it may be noted that Enderlein accepted *macilentus* as having only two submarginal cells). The redescription of *S. macilentus* by Hesse (1938) shows that in this species the eyes may be contiguous, subcontiguous or separate in either sex; thus the type species of *Systropus* s. str. overlaps both genera in the only character separating them and in view of this and the general variability of the contiguity of the eyes even within a restricted subgenus, *Cephenius* cannot be maintained as distinct. However, *S. studyi* exhibits certain characteristics of body form and colour which may merit the re-introduction at a later date of *Cephenius* as a subgenus. These characters are commented upon in various contexts in the following pages.

Systropus macilentus GROUP

A small group of four species centred on the generotype and characterized as follows: fore and mid tibiae without conspicuous silvery pubescence, hind femora with some spines below; pteropleuron without a distinctly tufted patch of silvery or white hair on posterior margin; petiole of four segments (II-V), club well differentiated although small; pale areas of body and legs reddish, reddish brown or brown; wing distinctly infuscate, with two or three submarginal cells. The group is restricted to the Cape and adjacent south-west areas (fig. 2).

Systropus (*Systropus*) *macilentus* Wiedemann

Systropus macilentus Wiedemann, 1820 : 19, Fig. 7; Wiedemann, 1828 : 360, 1; Bezzi, 1905 : 267; Bezzi, 1914 : 284; Hesse, 1938 : 1001, figs. 309-311.

Systropus miobrochus Speiser, 1910 : 77; Bezzi, 1914 : 284; Bezzi, 1924 : 116.

The identity of this species has been the subject of much controversy, to some extent settled by Hesse (1938) on the basis that the descriptions of Wiedemann and Macquart (1840) agreed with a distinctive Cape species possessing two submarginal cells. A residual uncertainty remains since, so far as can be dis-

covered, no-one has examined Wiedemann's original material. The difficulty stems from a remarkable oversight on the part of almost every author subsequent to Wiedemann and is concerned with the statement in Wiedemann's work of 1828, relative to his material of *macilentus*, "in Westermanns Sammlung auch in Berliner Museum". But *macilentus* was described in 1820 and the material is located simply as "in Westermanns Sammlung". Hence the Berlin material must have been examined by Wiedemann subsequent to 1820 and, as it cannot therefore be original material, cannot be considered as part of a type series and need not have been brought into discussions such as that in Bezzi (1924). Zimsen (1954) lists one specimen of *macilentus* in Westermann's collection at Copenhagen (it should be noted that Zimsen's reference to "Ausz. zw. Ins" is very misleading as it perpetuates the erroneous impression that *macilentus* was described in this work [cf. Hesse (1938)]), so that this specimen must be the holotype. Through the kindness of Dr S. L. Tuxen I have examined this specimen. It carries labels "♂: Mus. Westerm.;" "TYPE"; *Systropus macilentus* Wied. Cape Good Hope Sept. 1817". It is a female in excellent condition, the right third antennal segment and right hind leg missing, is the indisputable holotype of *S. macilentus* and is now described in full.

Head: occiput black, densely grey pollinose except for broad ocular margins and a narrow median stripe, clothed with fairly dense and long black hair, that at lower eye angles somewhat longer and distinctly resplendent, hair on head beneath also resplendent blackish; ocellar tubercle reddish; eyes separated by distinctly more than width of anterior ocellus, interocular stripe short, about same length as ocellar tubercle and matt black; frons long, black, densely grey-white pollinose with resplendent hair near antennae; face reddish with well developed tuft of long, resplendent brown hair, genae reddish along eye margins where also slightly silvery-grey pollinose but blackish along buccal margin, upper buccal margin and cavity black, lower buccal margin and cavity clear pale yellow; antennal tubercle and first antennal segment red, second antennal segment red with blackish apex, first and second segments black-haired, third black, spear-shaped and evenly narrowing to blunt apex, segmental proportions 3.7 : 1 : 3; proboscis short, 3.25 mm, black, palpi light reddish. *Thorax*: mesonotum moderately punctate, slightly rugose, disc black, humeri, humeral angles broadly, notopleura broadly, teguliform lobes, postalar calli and posterior margin broadly, reddish; pleura reddish, propleural callus blackish in part, propleuron below spiracle broadly black, mesopleuron black; metanotum rugose, red; metasternum with shallow transverse grooves in lower half, black but broadly reddish around edges, membranous cleft reddish; pubescence predominantly silvery-white, that on pronotum, in paired admedian stripes on mesonotum, on humeral angles and in a band along upper mesopleuron, black or blackish, that on metasternum distinctly longer and denser, meso- and pteropleuron without tufts; scutellum moderately rugose, black, narrowly ferruginous along hind margin, with silvery pubescence, strigulae foliate, clear pale yellow. *Abdomen* with four-segmented petiole of II-V, club small but clearly differentiated; I black, broadly red at base, II-V red with blackish ventrolateral line, club dark castaneous brown, somewhat more reddish anteriorly on VI and more blackish posteriorly on VIII; pubescence black except that on I

white, some sparse white hair at sides of II, that on club dense; ovipositor short with blunt dorsal shoulder, excavate margin and blunt, curved apex. Legs with fore and mid coxae shining castaneous-brown, reddish basally, hind coxae black; fore and mid legs reddish, last four tarsal segments darkening from brown to black, callus of fore femur reddish brown and half femoral length, minutely black pubescent; pubescence black, sparse, without trace of silvery pubescence on tibiae; hind leg with trochanter black, femur red, spinules sparse and black basally, reddish brown medially, dense and black at apex giving blackish appearance to femur apically, tibia red, black in apical swollen part, pubescence reddish, black on black apex except reddish below apically; metatarsus reddish but black apically, tarsus otherwise black; spines and spicules of hind leg black, three small spines below on femur, the apical largest, those on tibia small, 4 : 7 : 8, the anteroventral row the longest; all claws black, pulvilli whitish. Wing with two submarginal cells; extensively brown-yellow infuscate, this infuscation extending into second basal cell, base of first posterior cell and to apices of marginal and first submarginal cells, the remainder of wing decidedly brownish subhyaline; first posterior cell widely open; pubescence of R whitish above; alular fringe dark, squama auriform, black, fringe dark above, longer and white below, haltere with stem brown, knob above castaneous, below yellowish.

Length of body 16 mm, of wing 9 mm.

From the preceding description it is clear that Hesse (1938) was correct in his determination of *macilentus* as a species with two submarginal cells, and also that Bezzi (1924) was right to lay stress upon the evidence provided by the figure, showing only two submarginal cells, which accompanied Wiedemann's original description. The assumption that *macilentus* has three submarginal cells derives from the Berlin specimens referred to by Wiedemann in 1828 which indeed possess three submarginal cells but belong to *sanguineus* Bezzi; these specimens are discussed below. *S. miobrochus* was proposed as a *nomen novum* for *macilentus* Wied. *sensu* Macquart, Speiser concluding, presumably from the Berlin specimens, that *macilentus* possessed three submarginal cells. Since there is no doubt that Macquart correctly identified *macilentus* the introduction of *miobrochus* was unnecessary, as Bezzi contended in 1924 and had already indicated in 1914. Bezzi, however, did not follow his convictions since in his check list (Bezzi, 1924: 20) he retained *miobrochus* Speiser as a valid species to replace *macilentus* *sensu* Macquart, a quite unfortunate procedure which probably led Hesse (1938: 1028) to list *miobrochus* as a good species.

S. macilentus appears to be decidedly uncommon, no recent records other than those cited by Hesse being known to me. The series standing over the name *macilentus* in the British Museum all have three submarginal cells and are referable to *sanguineus*.

Systropus (Systropus) namaquensis Hesse

Systropus namaquensis Hesse, 1938 : 1006.

Systropus (Systropus) barnardi Hesse**Systropus barnardi** Hesse, 1938 : 1006, figs. 312-315.

Neither *namaquensis* nor *barnardi* appear to have been recorded since their description. Their association with *macilentus* is based upon the relationships suggested by Hesse.

Systropus (Systropus) sanguineus Bezzi**Systropus sanguineus** Bezzi, 1921 : 103; Hesse, 1938 : 1021, figs. 324-325.**Systropus macilentus** Wied., Wiedemann, 1828 : 360, 1 (in part).

Systropus macilentus Wied., *sensu* Schiner *not* Wiedemann, Schiner, 1868 : 134, 52, **syn. nov.**

Coptopelma schineri Enderlein, 1926 : 70, **syn. nov.**

The only structural point in which this species diverges from *macilentus* is in the presence of three submarginal cells. The abdominal club is less well defined; the ratios of the widths of abdomen V at its anterior margin to VI and VII at their maximum widths are, for *macilentus* and *sanguineus*, as follows:

Abdomen	V	VI	VII
<i>macilentus</i>	1	2.1	2.4
<i>sanguineus</i>	1	1.9	2.1

Otherwise the two species agree completely in body structure, absence of silvery tomentum on fore and mid tibiae but presence of spines on hind femur below (an uncommon attribute in the subfamily), absence of a pteropleural tuft, infuscate wings and reddish to reddish-brown and black colour pattern. The male genitalia of the two species (cf. illustrations in Hesse, 1938) are of the same type and differ in minor details only; in fact *sanguineus* is closer in this respect to *macilentus* than is *barnardi*.

Wiedemann in 1828 added "Auch in Berliner Museum" to his note of 1820 indicating the location of his material. Dr H. Schumann kindly sent these specimens for examination. Labelled as "Types" of *S. macilentus* they are a male and female, in an excellent state of preservation, of *S. sanguineus*. Thus, almost from the beginning, the two species have been confused and since the original confusion was due to Wiedemann himself it is not surprising that subsequent authors have been in difficulties, especially since the 1820 and 1828 specimens have been in different museums. The Berlin material is most probably that used by Schiner (1868) to determine *macilentus*, so that *macilentus* *sensu* Schiner must be *sanguineus* Bezzi. As Hesse (1938) has already pointed out, Schiner's notes on the venation of what he took to be *macilentus* show that he was acquainted with the only other species having three submarginal cells, *leptogaster* Loew, which could be identified with *macilentus* *sensu* Schiner. This supports the conclusion that *macilentus* *sensu* Schiner = *sanguineus* Bezzi so that *Coptopelma schineri* also falls

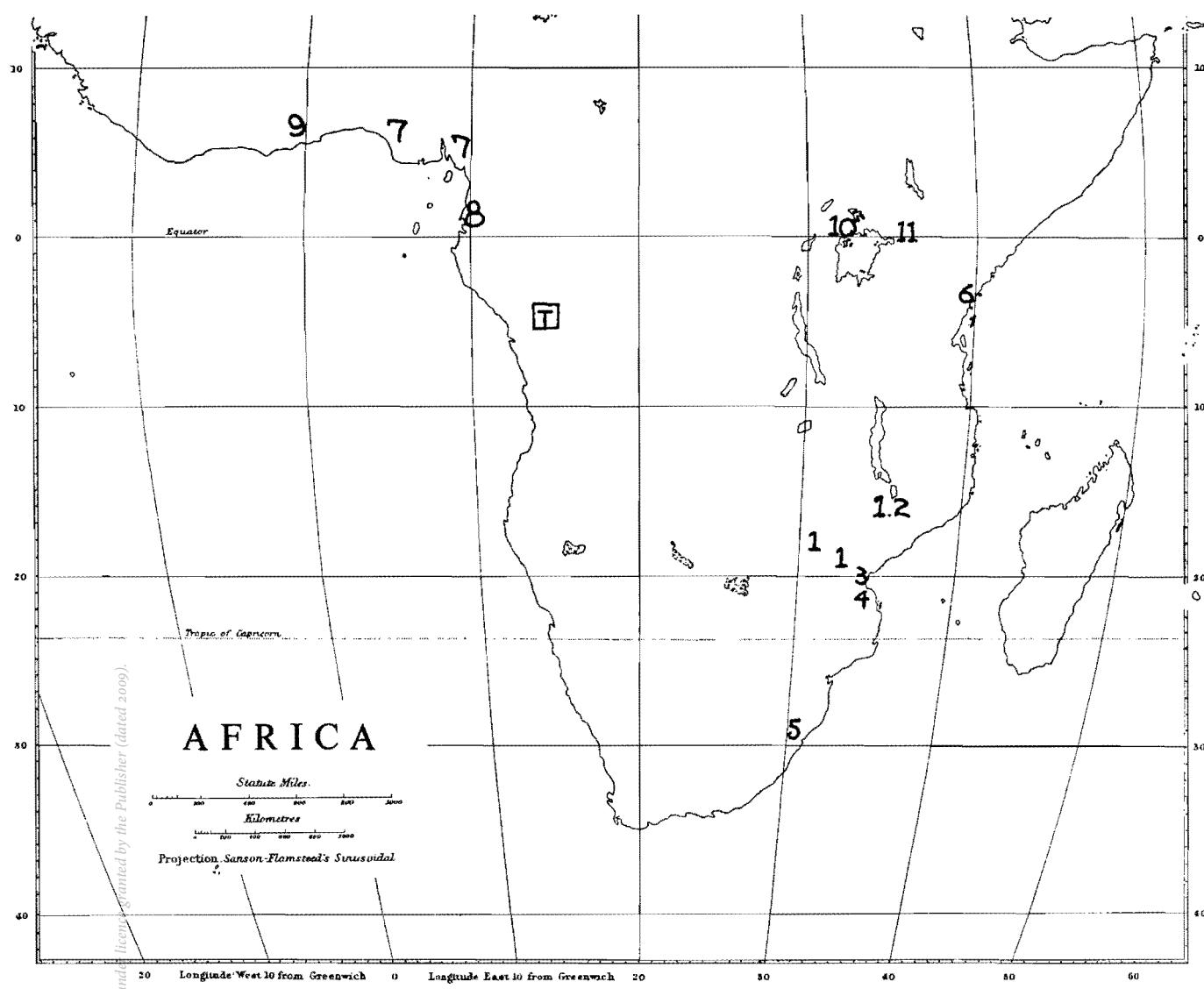


Fig. 3. Distribution of *Systropus* species: 1. *snowi*; 2. *rubripes*; 3. *syscius*; 4. *fumosus*; 5. *zuluensis*; 6. *leuoproctus*; 7. *silvestrii*; 8. *diremptus*; 9. *sericeus*; 10. *cheiron*; 11. *trispinosus*. T = Thysville.

as a synonym of *sanguineus* since it was introduced by Enderlein as a *nomen novum* for *macilentus* *sensu* Schiner.

As noted above, the British Museum material, which includes three specimens *ex* Bigot collection from Cape of Good Hope and others from Stellenbosch, all standing as *macilentus*, is referable to *sanguineus*, which appears to be a relatively common species.

Systropus snowi GROUP

This is a well defined eastern and southern group (fig. 3) of closely related species which are characterized by the presence of silvery pubescence on fore and mid legs and on the dorsum of the abdominal club, more or less infuscate wings which have two submarginal cells and the pale areas of the body and legs red or reddish in colour; abdominal petiole slender, three-segmented (II-IV), club well differentiated, not compressed.

The group follows naturally *macilentus* and allies, the main differences being the presence of silvery pubescence on legs and abdomen in the *snowi*-group and the unarmed hind femora.

Systropus (Systropus) snowi Adams

Systropus snowi Adams, 1905 : 156; Hesse, 1938 : 1015, figs. 320-321.

The redescription of Hesse, based upon a specimen determined by Adams, enables this species to be determined without undue difficulty. Apparently not uncommon, for a species of *Systropus*, in Rhodesia and Nyasaland I have seen, *ex* British Museum, material from Rhodesia, Umtali and Nyasaland, Mt. Mlanje, the latter comprising five specimens collected 25.III-5.IV and 11.XII. 1913, S.A. Neave.

The extension of the range of *snowi* to Nyasaland is not unexpected but is of interest in that *snowi* is sympatric with the following very closely allied species, tending to confirm the small difference separating species of *Systropus*.

On the other hand it is doubtful, as already noted by Hesse, whether the record of *snowi* from Thysville, Congo, by Curran (1928) refers to this species. The distribution of the *snowi*-group (fig. 2) does not suggest that one of its members would occur in the Western Congo, but it is to be observed that there is a complete absence of any record of any species of *Systropus* *s. lat.* from central and Southwest Congo, Angola, much of Southwest Africa and Western areas of Zambia and Rhodesia. Material from this large area is much to be desired; it may reveal that Curran's specimen represents an outlier of the *snowi*-group but on present evidence it is more likely to belong to the *silvestrii*-group (fig. 3) or *hessei*-group (fig. 4).

Systropus (Systropus) rubripes spec. nov.

Very close to *snowi* but considerably larger; face reddish yellow, third antennal segment reddish; antennal proportions 3.0 : 1 : 2.1 - 2.8, second segment

thus relatively shorter than in *snowi*; entire front of mesonotum, except for narrow median line, red, sides of mesonotum and notopleura broadly red, entire sternopleuron reddish, propleuron yellow in centre only; thoracic pubescence with that on pronotum and anterior faces of humeral angles black, short pubescence on black mesonotal stripe and on teguliform lobes black; abdomen with sides of II-IV reddish yellow, a narrow yellow stripe on sides of V in anterior quarter only (cf. *snowi*, only dorsal stripe and apical quarter black), pubescence of entire dorsal line from I-V black, VI and VII with dorsal pubescence white, only that on extreme sides black, last sternite of female with posterior margin much more steeply excised than that of *snowi* and sharply demarcated from narrower and sharper points; fore and mid legs entirely reddish, no ivory-yellow on outer faces; wings distinctly brownish-yellow infuscate, less so in male, in anterior half including discal cell, at least basal third of third posterior cell, the basal area of the infuscation and macula over base of R₂₊₃ of deeper brown tint; veins brown, pubescence of Sc and R₁ black above and below, bend of R₄ much less angular than in *snowi*.

Length of body 23-24 mm, of wing 14.5-16.0 mm, of proboscis 5-6 mm.

♀-holotype: NYASALAND: Mt. Mlanje, 23. I. 1914, S. A. Neave, Brit. Mus. (Nat. Hist.); ♂-paratype, same data as holotype (abdomen damaged, last 5 segments missing); ♀-paratype, Mt. Mlanje, 28.II. 1913, S. A. Neave (antennae, last 5 abdominal segments and four anterior legs missing); ♂-paratype, RHODESIA: Umtali District, 4.IV.1931, P. A. Sheppard (second and third antennal segments, fore tibiae and tarsi missing).

A large species, resembling an *Ammophila*, *S. rubripes* can be readily separated from the sympatric *snowi* by its large size, black hair on pronotum and Vein Sc (by which it also differs from all other members of the group) and mainly reddish legs.

Systropus (*Systropus*) *syscius* spec. nov.

MALE: Very close to *snowi*; thorax considerably less red, only humeral calli, narrow anterior stripe on mesonotum, and teguliform lobes red, thus anterior margin of mesonotum and notopleura medially black, postalar calli only obscurely red, scutellum black; prospiracular area and propleura yellow, a broad sutural area between sterno- and hypopleura plus lower parts of hypopleura red; abdomen with II-V more yellowish red than *snowi*; legs with anterior coxae yellowish anteriorly and apically, mid coxae and fore and mid femora blackish-brown anteriorly, only hind coxae reddish as in *snowi*, tarsal segments except basal one on each tarsus, black; body pubescence similar to that of *snowi* but shorter and sparser, abdomen VI with white hair only on posterior margin above, VII with white hair only on dorsum, its sides broadly black-haired; wings entirely brownish infuscate with a deeper yellowish brown tint occupying anterior parts as far as level of *r-m* cross vein, most of discal and second basal cells and only gradually shading into infuscate posterior parts; veins Sc and R₁ with pubescence white above, black below, R₄ bent almost at right angles, as in *snowi*, haltere

with stem and base of knob above brownish or brownish-black, most of knob ivory-yellow.

Length of body 14.0-14.5 mm, of wing 9.0-9.5 mm, of proboscis 3.3 m.m

♂-Holotype: MOZAMBIQUE: Barada, 26.IV. 1940, Col. B. Lebied, Brit. Mus. (Nat. Hist.); ♂-paratype, as holotype except 24.IV. 1940.

Readily told by the very dark wings this species has, with *fumosus* Hesse, the most extreme wing infuscation of the group. The following species, the most northerly of the group, is the opposite extreme with very lightly infuscate wings.

Systropus (Systropus) leucoproctus spec. nov.

Systropus snowi Adams, *sensu* Speiser *nec* Adams, Speiser, 1910 : 77.

Head: occiput black, densely silvery pollinose with long white hair on lower parts; ocellar tubercle reddish-brown; eyes separated by not more than width of anterior ocellus for distance equal to length of second antennal segment, anterior facets of male enlarged; frons black near eye divergence, otherwise yellow densely covered with gleaming yellowish to white tomentum; face yellowish with sparse white hair, genae and buccal margin yellow, genae with dense, gleaming white tomentum; antennae inserted on pale yellow tubercle, proportions of segments 2.5 : 1 : 2.0, first reddish, black near apex, second black, third black, lamellate, not narrowed at base but abruptly narrowed apically to a blunt point, pubescence of first two segments predominantly black with some intermixed white hair; proboscis black, reddish below at base, palpi yellowish. **Thorax** and scutellum black, mesonotum rugulose, sparsely punctate; humeral calli, notopleura and teguliform lobes, postalar calli, extreme basal angles of scutellum, reddish, propleura pale yellow, suture between sterno- and hypopleura brownish, latter also extensively brown on anterior margins; thoracic and scutellar pubescence entirely white, very short on mesonotum, longer and denser on pleura especially meso- and pteropleura, adpressed and gleaming on hypopleura and metasternum, latter deeply transversely grooved; strigulae foliate pale yellow. **Abdomen** black; sides and venter of petiole yellowish red, a narrow yellowish red anterior stripe on V continuous with lateral stripe of petiole; pubescence on dorsum of I-IV and most of V black, shiny, that on sides of I-IV, anteriorly at sides of V, on VI-VII entirely, white, that on VII dense and gleaming; genital lamella of female shining black, curved, pointed, with a prominent dorsal ridge, cerci blunt, short, brownish. **Legs:** coxae reddish, fore coxae blackish on anterior faces, all coxae with white pubescence and hind pair also with fairly dense white tomentum; femora blackish above, brown below, hind femora more extensively reddish or reddish brown in apical halves, fore and mid tibiae brown above, otherwise pale yellowish, outer faces with fairly dense white pubescence, basal segment of each of four anterior tarsi similar to tibiae, other tarsal segments blackish; hind tibiae black above, brownish below, tarsal segments black above, brown below, tibial spines 4 : 5 : 4 or 5 : 5 : 5; claws black, pulvilli dingy white. **Wing** slightly greyish with baso-marginal yellowish to yellowish-brown infuscation differing slightly in sexes; in

male base, costal and marginal cells yellowish-brown, a yellowish-brown smudge at base of R_2+3 , extreme base of second basal cell and base of alula yellowish; in female anterior infuscation extends over basal halves of marginal and first submarginal cells, a cloud over r_m cross vein continuous with infuscation in first submarginal, first basal cell yellowish in basal half and along lower margin to apex, anal cell yellowish between false vein and cu ; venation with r_m well past middle of discal cell, apical cross vein of latter moderately S-shaped, base of R_4 bent almost at right angles, first posterior cell narrowed at apex; squama yellowish with sparse white fringe, haltere with stem and base of knob above blackish, rest of knob pale yellow.

Length of body 15.0-16.5 mm, of wing 10 mm, of proboscis 4 mm.

♂-Holotype: KENYA: Coast Province, Kilife, Sokoke forest, 200 ft., IV. 1957, J. G. Williams, my collection; 2 ♀-paratypes, same data as holotype.

Immediately separable from *snowi* by the intermixed white hair on antennae and the less infuscate wings, *leucoproctus* is akin to *zuluensis* Hesse. These two species agree in possessing some white hair on antennae but differ in colour characters and wing infuscation which is paler and less extensive in *leucoproctus*. It is possible that *leucoproctus* is the species recorded by Speiser (1910) from Kibonoto, Kilimandjaro. The differences in colour and the less extensive wing infuscation noted by Speiser preclude *snowi* and indicate *leucoproctus* or a closely allied species.

Systropus (Systropus) zuluensis Hesse

Systropus zuluensis Hesse, 1938 : 1018, fig. 322.

Known from a single male described from Natal, *zuluensis* is the southern representative of the eastern coastal trio of species of the *snowi* group.

Systropus (Systropus) fumosus Hesse

Systropus fumosus Hesse, 1938 : 1019, fig. 323.

Known only from Portuguese East Africa this species is distinguished by the relatively short wings, the wing : body ratio being 1 : 1.8 compared with a range of 1 : 1.4 to 1 : 1.6 in all other species of the group. *S. fumosus* resembles *S. syscius* in its relatively dark colour and wing infuscation but can be distinguished, apart from wing ratio, by the much darker antennae, different thoracic colour pattern and more extensive white pubescence on abdomen.

Systropus crudelis GROUP

This group, consisting of four continental species and one from Madagascar (fig. 1) shows much in common with the preceding, notably silvery pubescence on legs, the form and colour pattern of the body and the presence of a usually well defined wing infuscation of the type found in *S. leucoproctus* (an antero-

basal infuscation with a more or less marked extension over discal cross vein), but it is distinguished by the unusual development of the pubescence, which is markedly long and shaggy, particularly on thorax and first abdominal segment, and predominantly white, petiole three- or four-segmented, or including anterior half of V, club well differentiated, not compressed.

Systropus (Systropus) crudelis Westwood

Systropus crudelis Westwood, 1876 : 574, figs. 1-12; Bezzi, 1924 : 120, 89; Hesse, 1938 : 1012, figs. 318-319.

Of this well known South African species, the most southerly member of the group, a record of interest is Natal: March 1960, one female reared from a cocoon of the limacodid *Coenobasis amoena* Feld., confirming the host record given by Hesse (1938 : 1015).

Systropus (Systropus) hirtulus spec. nov.

MALE: Close to *crudelis*. **Head:** occiput black, greyish pollinose with long white hair; ocellar tubercle reddish; eyes comparatively widely separated by distinctly more than width of anterior ocellus for distance about half length of second antennal segment; frons pale yellow, it and blackish interocular stripe with dense, gleaming silvery pollen; face and genae entirely pale ivory-yellow, densely silver pollinose, the fine hairs beneath antennae white; antennal tubercle clear pale yellow, antennae black, extreme base of first segment yellow, joint between first and second brownish, third narrow, blade-shaped, apex evenly pointed, pubescence of first and second long, dense, white, antennal proportions 3.0 : 1 : 2.5; proboscis long, attenuate, black, reddish-brown above at base, palpi brownish. **Thorax** largely black, mesonotum shining, slightly rugose and moderately punctate; humeral calli, a short oblique stripe from humeri, anterior half of teguliform lobes, postalar calli, entire propleural area, clear yellow; sutural area immediately below haltere reddish; pubescence entirely white, glistening, long and shaggy, prominently tufted on posterior part of mesopleura and on pteropleura, pleura densely grey dusted with shining black areas on meso- and pteropleura, to a lesser extent on sternopleura and upper metasternum; scutellum all black, rugose, punctate, pubescence white and long, strigulae yellow. **Abdomen** with petiole of segments II-V, club well differentiated; predominantly black, a ring at base of I, all of II-V reddish, darkened medially above, especially V, posterior margins of VII and VIII narrowly reddish that of IX broadly reddish yellow; pubescence predominantly gleaming white, that on I long and shaggy as on thorax, elsewhere short and adpressed, the lower sides of VI-VIII and corresponding sternites shortly black-haired. **Legs:** anterior coxae clear ivory-yellow as propleura, fore legs yellow, femora darkened above at base, last four tarsal segments black, dense silvery pubescence on posterior faces of tibiae and basal segment of tarsi; mid coxae reddish, remainder of these legs missing; hind coxae and legs reddish, tibiae appearing black apically because of dense black

spicules, tarsi gradually darkening from reddish basally to black on last segments; spines of tibiae short, black, 6 : 6 : 4; claws black, pulvilli yellowish. *Wing* clear hyaline with brownish pattern occupying costal margin broadly and giving off a band covering most of marginal cell, basal half of first submarginal cell, apex of first basal cell and base of first posterior cell (briefly, a broad band over *r-m* cross vein into upper part of discal cell), a prominent brown stain along length of anal vein; veins brown; R4 obtusely rounded with a small appendix, first posterior cell widely open at apex; squama yellow with white fringe, haltere with stem and upper part of knob brownish yellow, lower part of knob ivory-yellow.

Length of body 15.5 mm, of wing 11 mm, of proboscis 5.3 mm.

♂-Holotype: NYASALAND: Mt. Mlanje, 10.II.1914, S. A. Neave, Brit. Mus. (Nat. Hist.).

Readily separated from *S. crudelis* by the entirely yellow propleural area and anterior coxae, it can also be distinguished from the following species by different thoracic colour and pattern including entirely yellow propleura, a darker and more extensive wing infuscation and the absence of a dark pre-apical ring on hind tibiae.

***Systropus (Systropus) cruentatus* spec. nov.**

FEMALE: *Head*: occiput black, densely grey pollinose and with long, shaggy white hair; ocellar tubercle reddish brown; eyes separated by width of anterior ocellus for about one-third distance ocellar tubercle to antennae, thereafter diverging rather rapidly; interocular stripe and frons at eye divergence black, frons otherwise pale reddish brown clothed with short white hair near antennae; face, genae and buccal margins yellowish, face with sparse rather long white hair, genae and buccal margin with dense, glistening white tomentum; antennal tubercle reddish with narrowly yellow sides, antennae with third segments missing, proportions of first two 3.9 : 1; first reddish with long white pubescence, second reddish with long white hair basally, black with long black hair apically; proboscis black, palpi pale reddish. *Thorax* predominantly black, mesonotum strongly rugose, coarsely punctate posteriorly, metasternum only slightly ribbed; humeri, broad lateral spots on anterior margin of mesonotum, entire notopleura, teguliform lobes, postalar calli and prospiracular area red, propleura yellow, a broad reddish brown stripe from wing base to mid coxae; pubescence long, shaggy, white, denser and longer on hypopleura and metasternum; scutellum black, basal angles and apex beneath reddish, clothed as thorax, strigulae foliate, yellow. *Abdomen* with petiole of segments II to IV gradually expanding through V into differentiated club; mainly black, base and venter of I, II to V and anterior half of VI reddish, petiole with black dorsal stripe and narrow black ventrolateral line, pubescence mainly white, that on I long as on thorax, that on II to V short and sparse, black and dense on median dorsal stripe, that on VI mainly black, that on VII to IX longer and denser; last tergite carinate, ovipositor scoop-like, cerci blunt, black. *Legs*: first two pairs, including coxae, predominantly reddish,

anterior faces of femora and tibiae a little darkened, last three tarsal segments black, tibiae and first two tarsal segments with dense, shining white pubescence on posterior faces; hind leg with coxae and femora reddish yellow, femora darkened slightly anteriorly to apices and densely covered on darkened areas with short black spicules; tibiae reddish-yellow with golden pubescence and a broad median band of dense black hair giving the appearance of a black median band, spines 5 : 7 : 3, tarsi with first two segments and bases of third reddish yellow appearing black at apices because of dense black hair, apical parts of third and the other segments black; all claws black, pulvilli yellow. Wing greyish hyaline, base, costal cell, upper part of first basal cell, upper part of marginal cell, a large discrete spot over *r-m* cross vein extending across first submarginal cell to middle of marginal cell, and another, small spot at base of *R*4, yellowish-brown, a brownish spot at base of second basal cell and upper anterior angle of anal cell; veins brownish, *r-m* well beyond middle of discal cell, apical cross vein of latter parallel to wing margin, slightly S-shaped, first posterior cell widely open at apex; squama yellowish with long white fringe, haltere yellowish, stem and knob blackened above.

Length of body 20.5 mm, of wing 12 mm, of proboscis 4 mm.

♀-Holotype: KENYA: Kijabi Escarpment, -VIII.1952, K. M. Guichard, in my collection.

The form of the petiole, which gradually expands through abdomen V into the club, links the members of the *snowi* group, with a three-segmented petiole, to those species of the present group, such as the preceding, with a four-segmented petiole. *S. cruentatus* differs from *crudelis* by the more extensively yellow propleura, continuously reddish notopleura and more extensively red abdomen; the wing infuscation is reduced from that of *S. hirtulus* in that the median band of the latter species has become, in *S. cruentatus*, a discrete spot over *r-m*. The species is the most northerly of its group.

Systropus (Systropus) munroi Hesse

Systropus munroi Hesse, 1938 : 1010, figs. 316-317.

The long, shaggy pubescence and the structure of the genitalia, place this species, described from a single male from the Transvaal, in the *crudelis* group. It is, however, unusual in the development of a yellow, rather than reddish, pattern and in the nearly hyaline wings. It is described as having a faint spot at the radial fork, indicating an extreme reduction of the wing pattern found in *cruentatus*.

Systropus (Systropus) limacodidarum Enderlein

Systropus limacodidarum Enderlein, 1926 : 89.

Described rather briefly from 21 examples reared from two species of Limacodidae, *Latoia albifrons* Guer. and *Parasa affinis* Mab., *S. limacodidarum* will be

redescribed and a lectotype fixed in a forthcoming revision of the Bombyliidae of Madagascar. It is readily recognized by the yellow mesonotal pubescence but is otherwise most similar to *crudelis*, particularly in the relatively lightly infuscate wings which do not possess a cloud over *r-m* cross vein.

Systropus silvestrii GROUP

This is a group of four very closely related equatorial species (fig. 3), sharply differentiated from the three preceding groups. It is characterized by generally moderate size, very dark body colour with greatly reduced, sometimes almost absent, yellow ornamentation, abdomen with three-segmented petiole and clearly defined club, wings more or less strongly infuscate. The group is connected to the *snowi* and *crudelis* groups by the presence of dense silvery pubescence on fore and mid tibiae but the body pubescence is short and usually sparse and without silvery or white pubescence on abdominal club.

Systropus (Systropus) silvestrii Bezzi

Systropus silvestrii Bezzi, 1914 : 283, 8; Bezzi, 1924 : 118 (key).

Cephenius subcingulatus Enderlein, 1926 : 88, **syn. nov.**

Of the two males cited by Enderlein one is in good condition, one antenna missing, and has been designated as lectotype of *C. subcingulatus* and has been so labelled. The second male is covered with fungus and has been labelled a paralectotype. Both specimens in the Humboldt Museum, Berlin. *S. silvestrii* is a distinctive species which has not been adequately described and compared with other species. A detailed redescription is now provided; to date I have seen only male specimens.

Head: occiput black, grey pollinose with sparse white pubescence; ocellar tubercle red-brown with small patch of greyish tomentum; eyes with upper anterior facets enlarged, closely contiguous for distance equal to or somewhat longer than length of second antennal segment, interocular stripe silvery pollinose; frons very small, not much longer than upper part of antennal tubercle and dull black shading to clear yellow at antennal tubercle, grey pollinose at eye margins; face blackish with short dark hair; genae clear pale yellow, lightly silvery pollinose, buccal cavity pale yellow; antennal tubercle ivory-yellow, antennae dark reddish brown on first segment becoming black on second and third, first and second black-haired, proportions 2.5 : 1 : 2.0, third segment broad blade-shaped with blunt apex; proboscis black, palpi brownish-black. **Thorax** black; humerus, a broad oblique stripe from humerus onto mesonotum, a spot or narrow stripe at middle of teguliform lobe, which may be reduced or absent, postalar callus, prospiracle and propleuron in lower part, yellow, propleural callus brownish, upper part and edges of metasternal insertion brownish yellow; scutellum black, strigulae ivory-yellow; pubescence of mesonotum fine, short, black, that on pronotum and yellow areas of mesonotum white, that on pleura sericeous-white, denser and tufted

on pteropleuron, some dark hairs on mesopleuron, metapleuron densely grey pollinose, metasternum with black hair, a small patch of white hair at each upper angle; mesonotum finely rugose, metasternum moderately ribbed. *Abdomen* with petiole of segments II-IV, club somewhat rounded, clearly differentiated; black, sides of I-IV broadly yellow to bone-yellow, upper margins of yellow area faintly reddish, posterior margin of V yellow at sides, club sometimes brownish at sides, reflexed edges of VI and posterior margins of sternites VI-VII sometimes yellowish-brown; pubescence black, that on sides of I-IV and on pale areas of V white, that at sides of I long, tufted, that on VIII sparse revealing shining integument. *Legs* with first four coxae brownish-yellow, hind coxae brown but yellowish behind; fore and mid legs reddish-yellow, femora yellowish behind at apices, tibiae broadly yellow posteriorly, tarsi gradually darkening to black apically, metatarsi yellow beneath; hind legs reddish to reddish-brown, femora and tibiae yellowish beneath, tarsi darkening to black apically; callus of fore femur brown, with slightly iridescent surface and fine silvery pubescence; serially arranged spicules black, dense and obscuring ground colour on femora, fore and mid tibiae with dense silvery pubescence posteriorly, hind femora and tibiae with white pubescence ventrally, hind tibiae with spines short, arranged 4 : 5 : 7; claws black, pulvilli whitish. *Wing* uniformly smoky, anterior margin more deeply yellowish-brown infuscate, extending into anterior part of first basal cell; R1 white-haired on both sides, R4 strongly angled, first posterior cell narrowed at apex; squama yellow with dusky fringe, haltere with yellowish-brown stem, base of knob black, apex ivory.

Length of body 15.5-17.0 mm, of wing 9.0-9.5 mm.

It is to be noted that Enderlein gave his description as referring to both sexes; his specimens are two males. *S. silvestrii*, which is now known from Nigeria and Cameroon, shows the greatest development of yellow ornamentation in its group, but even so the amount of ornament is reduced compared to that of the preceding groups.

Systropus (Systropus) diremptus Enderlein

Systropus diremptus Enderlein, 1926 : 90.

This species is very close to *silvestrii*, although Enderlein described them in separate genera. Only the female holotype is known.

Differs from *silvestrii* (♂) as: eyes separated by slightly less than width of anterior ocellus for a distance about twice length of ocellar tubercle, thereafter diverging evenly into frons, the latter black, pollinose with a distinctly brassy tinge, head otherwise similar to *silvestrii*; antennae missing except for first segment of right side. *Thorax* similar to *silvestrii* but humeral stripe absent, humeri less yellow, blackish around edges, prothorax less extensively yellow with much blackish suffusion around edges; mesopleural hair with yellowish tinge. *Abdomen* with sides of petiole extensively yellowish with rather indefinite brownish black lateral smudges, dorsum of club shining black but reflexed edges of tergites and venter rust-coloured, to reddish yellow on sternite VII; pubescence at sides of club and on

entire venter from V onwards golden, that on remainder black. *Legs* with femora distinctly darker, fore and mid femora even blackish basally, tibiae reddish-brown, fore and mid pairs yellow posteriorly with dense silvery pubescence. *Wing* more distinctly yellowish-brown all over, costal margin and nearly proximal half more deeply toned; R1 dark haired on both sides, R4 more smoothly curved and first posterior cell widely open; haltere less extensively ivory on knob.

♀-Holotype: SPANISH GUINEA: Alcu-Benito district.

In view of the marked difference in abdominal pubescence (a character overlooked by Enderlein) between *diremptus* and *silvestrii* it is as well to retain *diremptus* as a valid species; associated males are desirable in order to clarify its relation to *silvestrii*.

Systropus (Systropus) sericeus Bezzi

Systropus sericeus Bezzi, 1924 : 192, 92; Bowden, 1964 : 52.

Known only from Ghana, this species differs from *silvestrii* by the reduction of the yellow ornamentation and the dense black pubescence on the abdominal club.

The following species is very close to *sericeus* and may be an eastern subspecies of the latter.

Systropus (Systropus) cheiron spec. nov.

Head: occiput black with dense silvery pollen, short black hair at vertex and longer white hair elsewhere; ocellar tubercle reddish brown; frontal triangle reddish-brown in male, dingy yellowish in female, silvery pollinose; face black in male, dingy yellowish in female, both with tuft of short, black hair; genae blackish in upper parts becoming dingy yellowish on lower parts, densely silvery pollinose; antennal tubercle pale yellowish, antennae black, first segment attenuate, third broad, lamellate, blunt at apex, pubescence of first and second black, proportions 2.6 : 1 : 1.9 (range 2.3 : 1 : 1.7 to 2.8 : 1 : 2.1); proboscis short, black, palpi black. *Thorax* black, mesonotum rugose, moderately punctate anteriorly, pleura rugose, metasternum rugose and strongly ribbed; humeral calli narrowly whitish to pale bone-coloured, teguliform lobes with small, median yellowish spot; pubescence short, sparse, black on mesonotum, whitish on pleura and metasternum, pteropleura with small tuft of longer white hair; scutellum black, rugose, shortly black-haired, strigulae small, rather auriform, dull yellow. *Abdomen* black, petiole (segments II to IV) with narrow lateral pale yellow or bone-coloured stripe expanding to form a narrow band around posterior ventral margin of each petiolar segment; pubescence generally short, sparse and black, club therefore rather shiny, pubescence of I considerably longer and forming small black lateral tufts, that of pale lateral stripe of petiole white; ovipositor with last sternite simple, lamellae short, bluntly triangular. *Legs*: first four coxae and femora brownish, their tibiae blackish-brown above, pale yellow to bone-coloured poster-

iorly, tarsi black but first two segments pale yellowish below, femora with short black pubescence, tibiae with short black pubescence anteriorly and short, dense silvery pubescence posteriorly, basal segments of tarsi with short, stout yellow bristles and silvery pubescence posteriorly; hind legs with coxae black, femora and tibiae dark brown above, yellowish below, tarsi black, femora with usual short, black radially arranged spicules, tibiae with a comb of 4 to 6 strong apical antero-ventral setae in addition to usual spines which are arranged 5 : 5 : 6 or 4 : 5 : 4; all claws black, pulvilli dusky. Wing entirely brownish infuscate, more strongly along anterior margin, in female posterior margin slightly paler thus costal infuscation more contrasting; veins black, *r-m* cross vein well past middle of discal cell, apical cross vein of latter strongly S-shaped, *R₄* bent almost at right angles, first posterior cell strongly narrowed at apex; squama practically absent, brownish, haltere very long, blackish with pale ivory tip.

Length of body 16.5-18.0 mm, of wing 10.0-11.5 mm, of proboscis 3.0-3.5 mm.

♂-Holotype: UGANDA: Buganda, Mpanga Forest 22 m. S. of Kampala on Masaka Rd., on flowers of *Cissus adenocaulis* Stend. ex A. Rich., 13.I.1959, J. Bowden, in my collection; 5 ♂-paratypes, 1 ♀-paratype *in cop.* with holotype, same data as holotype.

This species is the darkest of the group with practically no yellowish ornamentation on the thorax and very little on the petiole. The reduction of ornamentation removes a source of useful differences for specific separation but the accumulation of other divergences between *cheiron* and the very closely related *sericeus* suggest specific, rather than subspecific, status for the former. They differ in shape of first antennal segment, extent of yellowish pattern, amount of pubescence of abdominal club (*cheiron* in this regard being closer to *silvestrii*), colour of legs and wing infuscation.

The species next to be considered, *S. trispinosus* Bezzi, occupies an isolated position within the Ethiopian fauna. Its affinities are with oriental species such as *eumenoides* Westw.

Species sola

Systropus (Systropus) trispinosus Bezzi

Systropus trispinosus Bezzi, 1924 : 117 (key).

This species appears to be one of those which Bezzi intended to describe in a memoir on the Bombyliidae of the Budapest Museum which was never published. The only reference to this species in the literature is in the key to the Ethiopian species of *Systropus* in Bezzi's Bombyliidae of the Ethiopian Region. The characterization is sufficient to establish the species and among the British Museum material are two specimens which run easily to *trispinosus*, are like no other Ethiopian species and are considered to represent Bezzi's species. The following description should enable it to be recognized.

MALE: *Head:* occiput black, grey pollinose with short white pubescence on upper part, lower part and ventral region of head with longer pale yellowish hair; ocellar tubercle reddish; eyes separated by less than width of anterior ocellus for distance distinctly less than length of second antennal segment; frons, antennal tubercle, face and genae clear yellow with dense silvery pollen, facial hair tuft small, glistening pale yellow; antennae (third segment missing in both specimens) with first segment yellow, black at apex, white haired above, black haired below and at apex, second black, black haired, proportions 3.6 : 1; proboscis black, palpi yellow. *Thorax:* largely yellow, mesonotum black on disc, sometimes black to edge midway along notopleura, posterior half of teguliform lobes black, pleura with broad black stripe from wing bases to mid coxae including most of mesopleura, metapleura and base of pteropleura, upper angles of sternopleura, with a large, broadly U-shaped mark on metasternum also black; pubescence short on mesonotum, black on black part, gleaming yellow on yellow areas, that on pronotum and humeral angles paler yellow, that on yellow parts of mesopleura yellowish, on central parts of mesopleura black, on posterior margins of mesopleura and on pteropleura dense, tufted and gleaming golden, that on hypopleura and yellow areas of metasternum short, gleaming golden, that on black mark of metasternum black; scutellum yellow with narrow black base and pale yellow hair, strigulae yellow. *Abdomen* with petiole of segments II-IV, club sharply differentiated, rounded; I black with large semicircular golden areas laterally below; II to IV mainly bright yellow, II with basal black band, II to IV with continuous dorsal black line and narrow lateral black stripes not attaining segmental margins, V black with large circular yellow areas excised on posterior margin, VI to VIII black with broad, virtually continuously yellow hind margins; pubescence mainly black, that on yellow areas of I long, tufted, golden, that on yellow areas of II to V short, yellow, VI to VIII with paired, submedian stripes of adpressed yellow hair, especially noticeable and gleaming when viewed from behind; (♀ has last sternite black with three very long sharply pointed spines according to Bezzi, 1924). *Legs:* anterior coxae yellow, others black, mid coxae somewhat reddish basally; legs otherwise almost entirely yellow, fore and mid femora slightly brown basally, these areas further darkened by blackish spicules; last two or three segments of all tarsi black; spicules dense and black on tibiae and tarsi, those on hind femora yellow except for narrow black anterior stripe on basal third, femora without spines, tibial spines 4 : 5 : 3; all claws black, pulvilli dingy pale yellow. *Wing* hyaline, costal cell yellowish-brown; R₄ evenly curved, first posterior cell slightly narrowed at apex; squama yellow with yellow fringe, haltere yellow.

Length of body 14.0-15.5 mm, of wing 9.0-9.5 mm.

NYASALAND: ♂, Ruol (?) 5.III.1913; ♂, Mlanje 12.XI.1913, both S. A. Neave, Brit. Mus. (Nat. Hist.).

It is possible to suggest, from a consideration of some Oriental species, a link between *trispinosus* and the *silvestrii* group. The development of two quite distinct colour patterns in otherwise closely related species (for example, in the subgenus *Teinopelmus*) is also relevant here. In his key to genera Enderlein (1926)

relied for primary characters on the number of submarginal cells and the contiguity of the eyes; neither are satisfactory above specific level. Nowhere did Enderlein utilize abdominal structure except to separate *Dimelopelma* with a two-segmented abdominal petiole. Yet, as already observed, there are two quite distinct types of abdomen within the *Systropus* - *Cephenius* complex and in the Oriental fauna two types of body ornamentation, ground colour black with superimposed yellow pattern and the converse, yellow ground with black pattern. In general the Oriental fauna exhibits a greater amount of yellow ornament than the Ethiopian and reds and browns are uncommon. It is possible to arrange the Oriental species in colour series connecting the yellow-ground species to the black-ground species. Within the group exemplified by *S. eumenoides* Westwood which possesses a rounded, three-segmented petiole and sharply differentiated, more or less rounded club, the series leads from the predominantly yellow *eumenoides* itself to the very dark *udei* Enderlein with reduced yellow ornament and a strong resemblance to *silvestrii*. The apparent affinity between *eumenoides* and *udei* based upon a structural similarity, suggests a comparable affinity between *silvestrii* and *trispinosus*.

The other main Oriental group, characterized by an elongate, laterally compressed abdomen with a three- or four-segmented petiole gradually expanding into an ill defined club centres around the generotype of *Cephenius*, *S. studyi*; Enderlein from China. In *studyi* the colour scheme is black with a superimposed yellow pattern but the series leads to species such as *flavipleurus* Brunetti, *edwardsi* Brunetti or *polistoides* Westwood which are yellow with a black pattern. The species next to be considered is closely related to *flavipleurus* and may be taken as the first species in the Ethiopian series with an abdominal structure similar to that of *studyi*, a character which may eventually help to reestablish *Cephenius* as a distinct subgenus.

Species sola

Systropus (Systropus) quadrinotatus nom. nov.

Systropus quadripunctatus Seguy, 1934 : 72 nec *quadripunctatus* Williston, 1901 : 293.

It has been necessary to rename this species, which will be redescribed in a revision of the Bombyliidae of Madagascar. Williston's species was described from Yucatan. Although the affinities of *quadrinotatus* lie apparently with the Oriental fauna, by analogy with *silvestrii* and *trispinosus* and *Teinopelma* species it may well be an extreme yellow form belonging to the following group with which *quadrinotatus* shares abdominal structure and the presence of silvery pubescence on the fore tibiae.

Systropus hessei GROUP

A small group of very distinctive facies which when recognized, cannot be confused with any other African forms. Characterized as follows: body colour sombre but often with contrastingly coloured abdomen and/or legs; without or

with greatly reduced yellow or red ornamentation; abdomen elongate, distinctly laterally compressed, petiole composed of segments two to four expanding gradually through five to an ill-defined club; fore and mid tibiae with dense silvery pubescence (? exceptionally black), apices of hind tibiae rather markedly clavate; wing with two or three submarginal cells, usually with dark to very dark infuscation.

At present I include two species from East Africa and one from West Africa (fig. 4) in this group and tentatively append a second West African species which, while agreeing in many features, exhibits some characters at odds with the other three.

Systropus (Systropus) hessei François

Systropus hessei François, 1954 : 1, fig. 1.

Described from montane forest in Urundi this is a distinctive species and easily recognized by its slender, elongate form, generally sombre colour and infumate wings but with the first three segments of the hind tarsi conspicuously yellowish golden. The colour of the hind legs is the easiest distinction between *hessei* and the following new species.

Systropus (Systropus) jactator spec. nov.

Head: occiput deeply hollowed, black, silvery pollinose and with long white hair on lower parts; ocellar tubercle brown; eyes contiguous for distinctly more than half (♂) or about half (♀) distance ocellar tubercle to antennal tubercle; frontal triangle brown to black, face brown to black with sparse black hair, genae black, near antennae becoming gradually brownish on lower parts, with silvery tomentum; antennal tubercle yellow; antennae black, extreme base of first segment yellow, first and second segments black-haired, third spear-shaped narrowing rather rapidly towards apex, proportions 4 : 1 : 2.5; proboscis black, ochraceous at base, palpi ochraceous. *Thorax* with mesonotum rugose and distinctly punctate especially in paired admedian lines and immediately before scutellum, teguliform lobes more strongly rugose but not punctate, black; humeral callus, propleuron, postalar callus and sclerites at wing base more or less brownish, pleura more definitely brown on hind margin of pteropleuron, fore and hind margins of sternopleuron and a large patch on fore margin of hypopleuron; pubescence sparse, black on mesonotum, ♀ with more pronounced black hair lines over admedian lines of punctations, pleural pubescence pale on propleuron and hind margin of pteropleuron, pale and longer on hypopleuron and metasternum, that on hind margin of mesopleuron black; scutellum black, rugose, black pubescent with more or less pale hairs around hind margin, strigulae foliate, yellow with brown bases. *Abdomen* with petiole of segments II to IV, V gradually dilating to narrow (in side view less than twice height of petiole), strongly laterally compressed club; dark reddish yellow, I black, II more or less extensively blackened basally and above, III and IV sometimes darkened in dorsal line; pubescence generally sparse,

dense dorsally on II to V, mainly black but reddish golden at sides and ventrally from III to VIII; female with last segment very narrow, quadrate in side view, cerci long, blunt, pale yellow. *Legs*: fore and mid legs black except for slight reddish brown areas at articulations and bases of coxae, tibiae with white pubescence posteriorly, denser on front pair; hind legs with coxae, femora and bases of tibiae black, apical halves at least of tibiae and first four tarsal segments bright ochraceous-yellow and with dense bright golden pubescence which is long ventrally on metatarsi, fifth segments of tarsi black, apices of tibiae distinctly clavate; all claws black, pulvilli yellowish to dingy-white. *Wing* entirely deep brown infuscate, darker, almost black towards base and along costal margin and generally with purplish reflections; veins brown, black basally; two submarginal cells, *r-m* cross-vein at middle of discal cell, apical cross-vein of latter long S-shaped; squama linear, with sparse dark fringe, haltere black slightly brownish black basally.

Length of body 23-24 mm, of wing 14-15 mm, of proboscis 3.5-4.0 mm, excluding long (1-2 mm) labellae.

♂-Holotype: UGANDA, Entebbe, -VI.1957, R. H. Carcasson, in my collection; paratypes: UGANDA: ♂, Entebbe, 15.V.1913, G. C. Gowdey (abdomen missing from V); ♂, Kawanda, 15.VI.1945, "Forest", H. S. Darling; ♂♀, Entebbe, -VII.1951, T. H. E. Jackson.

A striking species immediately recognizable by the very dark wings and conspicuously bicoloured hind legs. It is an ecological replacement of *hessei*; all the other species pairs appear to be geographical equivalents but with *hessei* and *jactator* the succession is altitudinal. The holotype and two of the paratypes from Entebbe were taken in small glades surrounded by patches of well established secondary forest around one of the numerous inlets of Lake Victoria; the Kawanda locality is of similar secondary forest further inland. Carcasson (1964) has shown that an altitudinal succession is a characteristic feature of the distribution of African butterflies, the critical altitude being, over most of the continent, at about 1700 m (5,000 ft.). This agrees well with the distribution of these two species of *Systropus* the montane forest of *hessei* being at 2,000 to 2,200 m, that of *jactator* at about 1,300 m.

The next species may be the geographical replacement of *hessei*.

Systropus (Systropus) holaspis Speiser

Systropus holaspis Speiser, 1914 : 6.

Coptodicerus clavatus (Karsch), *sensu* Enderlein *nec* Karsch, Enderlein, 1926 : 92.

Symballa leptogaster (Loew) *sensu* Enderlein *nec* Loew, Enderlein, 1926 : 92.

Symballa cuspidicauda Enderlein, 1930 : 67, *syn. nov.*

Although Speiser's description of this species, originally recorded from Douala in the Cameroons, is unsatisfactory it is nevertheless not difficult to recognize. I have examined Enderlein's material which is undoubtedly conspecific

with *holaspis* Speiser. The species *cuspidicauda* was described from one male, one female; they are in good condition, each with third antennal segments missing. The male has been designated and labelled as lectotype, the female paralectotype. Since there has been some uncertainty over the identity of *holaspis* the following redescription is provided.

Head: occiput deeply excavate, black, silvery tomentose, pubescence pale and sparse in upper parts, longer and denser in lower parts; ocellar tubercle reddish; eyes separated by margins only for about half distance ocellar tubercle to antennal tubercle, interocular stripe silvery especially in male, frontal triangle of male rather broader than that of female, frons densely clothed with silvery pubescence, face brownish with fine, sparse, white hair, face, genae and inner buccal margins densely covered with shining silvery tomentum; antennal tubercle yellowish, antennae brownish-black, base of first segment pale yellowish, first segment narrow, clothed with black hair denser at apex, second densely black-haired, third broadly spear-shaped, proportions 4 : 1 : 3; proboscis black, yellowish-brown below at base, palpi blackish. **Thorax:** mesonotum dull, rugose and punctate; black, humeral callus pale yellowish with oblique triangular mark extending onto mesonotum usually elongate but may be shortened or even absent except for glabrous, shining, narrowly brownish line; teguliform lobe with variable yellow median spot which may be reduced to a vague brown spot, postalar callus narrowly brown; propleuron yellowish to yellowish-brown, propleural callosity yellowish-brown to brown, sternopleuron black; pubescence of mesonotum black, denser in median and paired admedian rows; pleural pubescence sparse, white, that on metasternum denser and shining white; scutellum rugose and punctate, black, pubescence dark, fulgent, strigulae pale yellow. **Abdomen** with petiole of segments II-IV, V gradually expanding into laterally compressed, poorly defined club, reddish-yellow, generally paler on venter, I black, II rather darkened basally, VII and VIII darkened in female; pubescence on dorsum black, that on venter golden except for pregenital sternite of female which is black-haired; ovipositor shining black, rather strongly keeled dorsally, cerci narrow with long, yellowish hair. **Legs:** fore legs with coxae pale yellow, femora mainly brown but yellowish beneath towards apices, tibiae and tarsi yellowish, darkened above, the posterior surfaces of tibiae with dense, shining white hair, first two segments of tarsi with dense, golden hair below; mid legs with coxae black, dusky yellowish on anterior faces, rest of mid legs dark brown, to black on apical tarsal segments, femora yellowish below at apices, tibiae yellowish below with rather inconspicuous white pubescence posteriorly; hind legs with coxae black, femora black above and reddish-yellow below, tibiae black, yellowish below in basal two-thirds, apices distinctly clavate, spines 3 : 5 : 4; tarsi black; all claws black, pulvilli yellowish-white. **Wing** with three submarginal cells; distinctly brownish infuscate, darker along costal margin, slightly iridescent; veins brown, *r-m* cross-vein slightly before middle of discal cell, apical cross-vein of latter strongly S-shaped, *R* strongly recurrent; squama brownish with sparse brownish fringe, haltere with dark stem, knob shining blackish-brown with pale yellowish tip.

Length of body 15.5-20.5 mm, of wing 9.0-12.5 mm, of proboscis 4.5-5.0 mm.

Additional material examined: CAMEROUN, Kumba, ♀, 21.X.1949, ♂, 25.X.1949, H. Oldroyd; in Brit. Mus. (Nat. Hist.). The pair described as *cuspidi-cauda* are from Nassanakang in Cameroun while the female misidentified as *leptogaster* by Enderlein is from Spanish Guinea.

The species is easily recognized by its dark brown infuscate wings with three submarginal cells and the predominantly dusky red abdomen which is strongly compressed. Both Speiser and Enderlein compared *holaspis* with *leptogaster*, as did Bezzi (1914, 1924), assuming that relationship was indicated by the number of submarginal cells. Although *leptogaster* may indeed be an unusual member of the present group, *holaspis* is in fact closely related to *hessei* and, aside from the different wing venation, does not differ significantly from that species. The two species are close enough in appearance to be confused were it not for the number of submarginal cells and the unicolorous hind legs of *holaspis*.

The following species is included in the *hessei* group since it agrees in all major characters save one. This is the presence of black pubescence on fore and mid tibiae, a unique feature in the African fauna.

Systropus (Systropus) rufifemur Enderlein, **comb. nov.**

Cephenius rufifemur Enderlein, 1926 : 86.

I have examined the type series, consisting of a female from Spanish Guinea and two males from Cameroun. The female is in very good condition, complete except for the last two tarsal segments of the left hind leg and has been designated, and so labelled, lectotype. The males are affected by fungus, particularly the smaller and have been labelled paralectotypes. I have also examined a fourth specimen from Ghana. The following redescription from these four examples should enable the species to be recognized without difficulty.

Head: occiput black, grey pollinose with short white pubescence, that on lower margin longer and pale yellowish; ocellar tubercle reddish; eyes contiguous for distance distinctly longer than length of second antennal segment in male, slightly more or about this length in female, frontal triangle dull brownish, densely white or silvery pollinose; face blackish, tuft feeble, white; genae yellowish-brown, densely shining-white pollinose, buccal margin broadly pale yellow; antennal tubercle pale yellow, antennae light brown typically, even yellowish-brown below at base of first segment in male but dark mahogany-brown in western specimen with extreme apex of first segment lighter brown; first and second segments clothed with dense black hair, proportions 3.2-3.9 : 1 : 2.1-3.0; proboscis short with comparatively long labellae, brownish, palpi fine, brownish-yellow. **Thorax:** mesonotum comparatively smooth, only finely rugose, metanotum strongly rugose, metasternum strongly transversely grooved the membranous part deep and narrow; black, humeral calli narrowly ivory-yellow, humeral angles, an indefinite oblique stripe from humerus, postalar calli narrowly and pteropleuron obscurely, reddish, a narrow reddish line in middle of teguliform lobe, pleura with narrow reddish stripe from wing base to mid coxa, propleuron slightly reddish below spiracle; pubescence short, sparse, mainly glistening black, mesonotum

with paired admedian grey pollinose stripes, pubescence of pronotum and humerus longer, that on pronotum black in eastern specimens, pale yellowish in western example, that on pteropleuron brownish; scutellum black, extreme basal angles reddish, pubescence shining black, longer and denser than that of thorax, strigulae brown basally, clear yellow apically. *Abdomen* with petiole composed of II to IV gradually enlarging through V to laterally compressed club; I black, II to anterior half of V yellow but brownish along a dorsal stripe, posterior half of V brownish yellow, VI to VIII brownish-black; pubescence black, dense and shining causing brown integumental areas to appear black, that on sides of II to IV and anterior half of V gleaming golden; subgenital plate of female with posterior margin vertical leading abruptly into long, sharply pointed black cerci, the cleft between them deep. *Legs*: coxae black, fore coxae with marked iridescent sheen; fore and mid legs yellow-brown, last three segments of tarsi black, pubescence black rather dense on femora and especially on tibiae in eastern series the hair below on fore tibiae and tarsus bright golden; hind leg ochraceous-yellow to third tarsal segment, last two tarsal segments deep black, contrasting; femur and tibia with entirely golden pubescence in lectotype and on first three tarsal segments, males with blackish spicules above on femur, variable in extent, tibia with blackish spicules at least in basal half above, other female with black spicules dense and extensive causing hind leg to appear much darker; femur without spines, tibial spines 6 : 8 : 6; claws black; pulvilli light brownish. *Wing* with two submarginal cells; brownish-yellow infuscate in anterior half to include second basal cell and basal half of discal cell, remainder of wing brownish subhyaline; veins brown, R yellowish basally; R₄ abruptly bent, first posterior cell strongly narrowed at apex, even almost closed; squama brown with dusky fringe, haltere brownish-black, apical third of knob clear pale yellow.

Length of body 16.5-23.0 mm, of wing 10.0-13.5 mm, of proboscis 3-4 mm.

Redescribed from type series (♀ Spanish Guinea, 2 ♂♂ Cameroun), in collection of Zoological Museum, Humboldt University, Berlin; ♀, GHANA: Accra, -VII.1888, F. Swazzy, Brit. Mus. (Nat. Hist.).

The accession label to the last specimen, B. M. 1937-231, reads "S. Africa, F. Swazzy" but it seems clear from a second, handwritten label "Accra 7/88" that West Africa was intended. Accra is, of course, now capital of Ghana.

S. rufifemur is a distinctive species easily recognized by the almost entirely ochre-yellow hind legs and infumate wings. In facies as well as structure it closely resembles *hessei* and *jactator*, including the contrastingly coloured tarsal segments of hind leg but differs in the dense black pubescence of fore and mid tibiae. However, the pubescence of the legs reveals some interesting variation and the type series from the eastern areas also shows golden pubescence on fore tibia and tarsus. The lectotype, from the most easterly locality, has practically no black pubescence on hind leg whereas the two males from the intermediate Cameroun show a variable amount of black pubescence on hind leg culminating in the generally dense black pubescence on legs shown by the most westerly specimen from Accra. Additionally, the golden pubescence of the abdomen is of a deeper tint on all

three eastern examples than on that from Accra. There is thus the suggestion of an east-west cline of decreasing intensity of gold colour on abdomen and increasing black pubescence on legs. A very similar cline has already been recorded in West African forest bombyliids e.g. *Petrorossia gratiosa* Bezz (Bowden, 1964) and suggests that in *S. rufifemur* the white pubescence of fore legs general in the *hessei* group was replaced originally by yellow or golden pubescence which has darkened and dark areas become more extensive the further west the species has spread.

The occurrence of this species at Accra is, at first sight, somewhat unlikely since Accra is in a pocket of very low rainfall with xerophytic scrub vegetation. However the area around Accra was, at one time, much more heavily treed and wetter (Bowden, 1964) and it is probable that conditions 80 years ago more nearly approximated those of the eastern localities. Whether the species survives present conditions is another matter.

Reference has been made, when considering the relationship of various species, e.g. *silvestrii* and *trispinosus*, to the development of sharply contrasting colour patterns in otherwise closely related species, such as occurs in *Teinopelmus* species. The following species is structurally similar to the *hessei* group but has a very different body pattern.

Systropus (Systropus) leptogaster Loew

Systropus leptogaster Loew, 1860 : 200; Bezz, 1924 : 121, 90 (in part, **NOT** fig. 8); Hesse, 1938 : 1024, fig. 326.

Systropus clavatus Karsch, 1880 : 657, **syn. nov.**

Coptodicerus clavatus (Karsch), Enderlein, 1930 : 67.

While the species *leptogaster* has not been difficult to identify considerable confusion has existed over the identity of *clavatus* Karsch. So far as I am aware no-one has examined the type except Enderlein (1930) who had previously (1926) remarked that the type of *clavatus* was lost. From Enderlein's (1930) brief re-description there is a strong presumption that *clavatus* and *leptogaster* are one and the same but Enderlein's specimen does not appear, from his description, to be that of Karsch since Enderlein describes yellow thoracic markings whereas Karsch refers to "thorace nigro, antice et postice utrinque macula transversa tenui rubra". Dr Schumann kindly forwarded the specimen standing as type of *clavatus* in the Humboldt Museum. It is a male, in very good condition, the right mid leg missing. It bears an old label "Pr. b. sp. Dregé", one of Enderlein's type labels, a green label with "clavatus (N) Karsch" and a note in more or less illegible writing but which suggests that *clavatus* is the same as *leptogaster*. The thoracic markings of this specimen are bright yellow, as described by Enderlein and since it is in all probability the specimen described by Karsch it should be accepted as the holotype of *clavatus*, its author committing an inexplicable mistake in his description. There is no doubt that, on the evidence of this specimen, *clavatus* is a synonym of *leptogaster*.

The species is readily told by the possession of three submarginal cells

in the wing, yellow thoracic markings comprising, on the mesonotum, a broad oblique bar from humeri, a spot or band on teguliform lobes and, narrowly, on the postalar calli, and the entirely yellow propleuron and fore coxae, by the elongate, rather compressed abdomen which is mainly black with petiolar segments (II-IV and part of V) yellowish or reddish at sides and the generally light coloured legs with dense silvery pubescence on fore and mid tibiae. It may well be a derivative of the *hessei*-group, from which it is widely separated geographically (fig. 4) or, possibly of the *snowi*-group. From this group *leptogaster* differs in the absence of white tomentum on the abdominal club and the presence of predominantly yellow, not red, body ornament.

Not uncommon in eastern areas of South Africa particularly around the Durban area of Natal, Hesse (1938) has also recorded an atypical form from Portuguese East Africa, somewhat darker in colour and with a relatively longer first antennal segment.

Species Sola

Systropus (Systropus) daveyi spec. nov.

FEMALE: *Head:* occiput black, grey-dusted with sparse hair somewhat denser below; ocellar tubercle black; eyes in contact for distance about three times length of ocellar tubercle; frontal triangle brownish black with some greyish pubescence along eye margins and dense silvery tomentum above antennal tubercle; face brownish with sparse white hair, genae and buccal margin yellow with shining silvery tomentum; antennal tubercle yellow, antennae with first segment yellow at base, yellowish brown to brown apically, second and third black, first and second black-haired, third broad, lamellate, abruptly narrowed apically, proportions 3.5 : 1 : 3.7; proboscis black, palpi black. *Thorax* with mesonotum rugose; black, humeral and postalar calli, propleural area including spiracle, upper part of pteropleuron and spot on upper sternopleuron yellow; pubescence gleaming white, tufted over upper parts of meso- and pteropleuron, dense on hypopleuron and metasternum; scutellum rugose, black, strigulae yellow. *Abdomen* black, venter of I, sides and venter of petiole, which is composed of II to IV, yellow, posterior margin of each club segment whitish, last tergite brownish on disc; pubescence mainly black, white on yellow areas, some white hair on last segment and dense white hair across posterior margin of each club segment. *Legs* reddish-yellow, only mid and hind coxae and last three (fore legs) or four (mid and hind legs) tarsal segments brownish to black, tibiae without or with only sparse, inconspicuous white pubescence, hind femur with two short ventral spines, hind tibiae with spines 4 : 5 : 2, mid and hind tarsi with stout black spicules below. *Wing* with three submarginal cells, light yellowish-brown, more strongly infuscate in costal and marginal cells and yellowish basally; veins brown; R₄ oblique, apical cross-vein of discal cell slightly S-shaped; squama yellow with white fringe, haltere with light brown stem and yellowish-brown knob.

Length of body 15 mm, of wing 10 mm, of proboscis 3 mm.

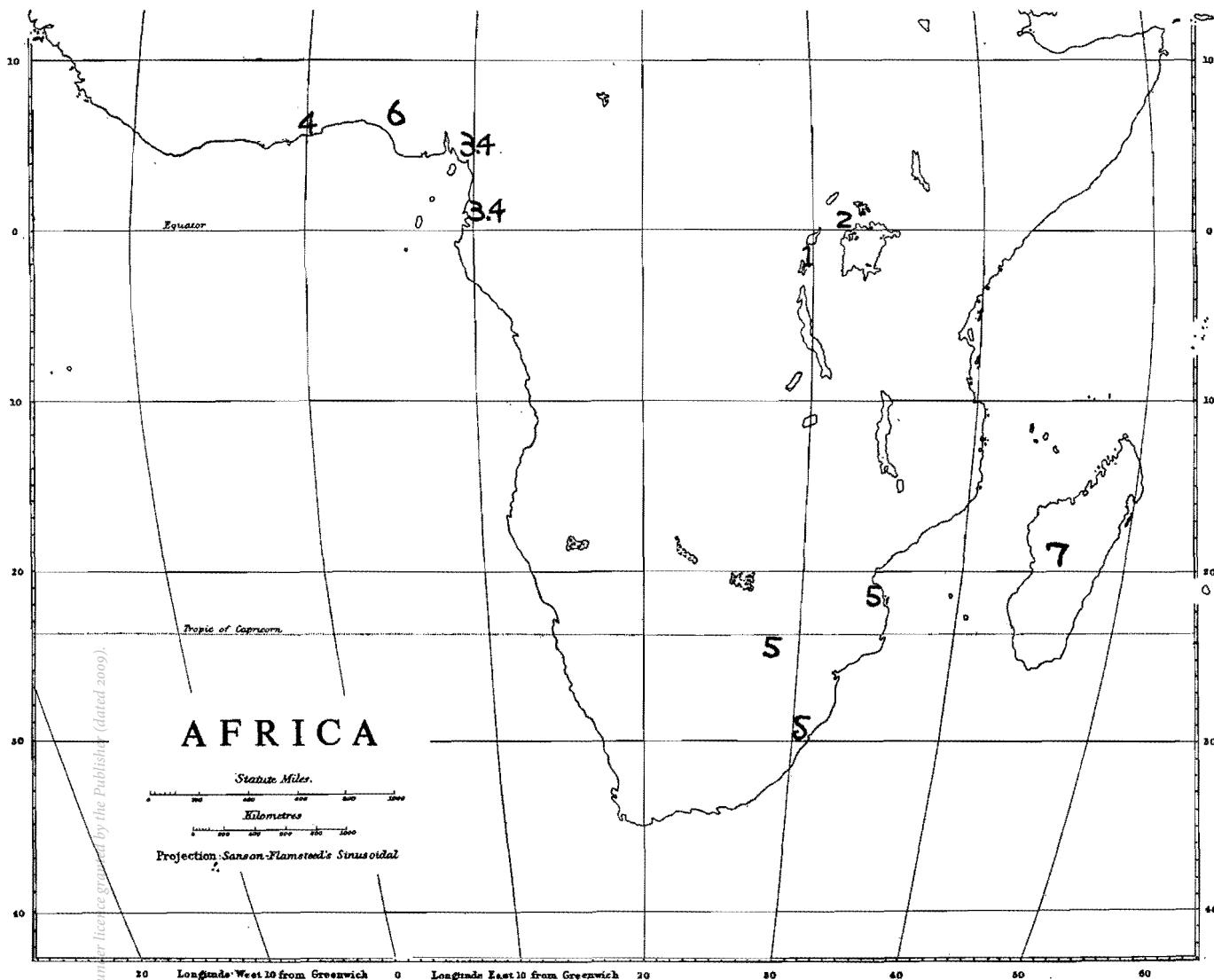


Fig. 4. Distribution of *Systropus* species: 1. *hessei*; 2. *jactator*; 3. *holaspis*; 4. *rufsemur*; 5. *leptogaster*; 6. *daveyi*; 7. *quadrinotatus*.

♀-Holotype: NIGERIA, Ibadan, Moor Plantation, 24.VII.1947, J. Bowden, in my collection. Named in memory of the late James T. Davey in whose company the holotype was taken.

This is a difficult species to place. Although bearing a superficial resemblance to *leptogaster* the two species do not seem closely allied. *S. daveyi* possesses an important character in common with the *macilentus* group, that is spinose hind femora, and further agrees with that group in the absence of conspicuous silvery pubescence on anterior tibia. It differs, however, in the much denser thoracic pubescence which is distinctly tufted over the meso- and pteropleuron and in the body colour which is black and yellow rather than the black and more or less emphatic red of the *macilentus* group. In both colour and pubescence *daveyi* approaches the *snowi* group but, obviously, disagrees with that group by virtue of its resemblances to *macilentus*. For the present *daveyi* must be left as an isolated species possibly near *macilentus*.

The preceding classification, in which 38 species are recognized, may be summarized as follows; previously accepted synonymy has been included.

LIST OF ETHIOPIAN SYSTROPINAE

SYSTROPUS Wiedemann

Subgenus	DIMELOPELMA	Enderlein
	<i>tessmanni</i>	Enderlein
	<i>pelopoeus</i>	spec. nov.
	<i>bicuspis</i>	Bezzi
	<i>rex</i>	Curran
	<i>trigonalis</i>	Bezzi
	<i>tribolus</i>	spec. nov.

TEINOPELMUS subgen. nov.

	<i>rugosus</i>	Bezzi
	macilentus	Wied. <i>sensu</i> Walker <i>nec</i> Wiedemann
	tenuis	Enderlein
	<i>rufidulus</i>	Bowden
	<i>buttneri</i>	Enderlein
	<i>nandinus</i>	spec. nov.
	leptogaster	Loew <i>sensu</i> Bezzi <i>nec</i> Loew (in part)

Subgenus	DIAEROPS	Enderlein
	Coptodicrus	Enderlein (in part)
	<i>marshalli</i>	Bezzi
	vespiformis	Enderlein

Subgenus	SYSTROPUS	Wiedemann
	Cephenus	Berthold
	Cephenes	Latreille
	Coptopelma	Enderlein
	Coptodicrus	Enderlein (in part)
	Symballa	Enderlein
	Cephenius	Enderlein

<i>macilentus</i>	Wiedemann
attenuatus	Macquart
capensis	Philippi
miobrochus	Speiser
<i>namaguensis</i>	Hesse
<i>barnardi</i>	Hesse
<i>sanguineus</i>	Bezzi
macilentus	Wied. <i>sensu</i> Wiedemann, 1828 (in part.)
macilentus	Wied. <i>sensu</i> Schiner
macilentus	Wied. <i>sensu</i> Karsch
schineri	Enderlein
<i>snowi</i>	Adams
<i>rubripes</i>	spec. nov.
<i>syscius</i>	spec. nov.
<i>fumosus</i>	Hesse
<i>zuluensis</i>	Hesse
<i>leucoprocatus</i>	spec. nov.
? snowi	Adams <i>sensu</i> Speiser
<i>crudelis</i>	Westwood
<i>hirtulus</i>	spec. nov.
<i>cruentatus</i>	spec. nov.
<i>munroi</i>	Hesse
<i>limacodidarum</i>	Enderlein
<i>silvestrii</i>	Bezzi
subcingulatus	Enderlein
<i>diremptus</i>	Enderlein
<i>sericeus</i>	Bezzi
<i>cheiron</i>	spec. nov.
<i>trispinosus</i>	Bezzi
<i>quadrinotatus</i>	nom. nov.
quadripunctatus	Séguy <i>nec</i> Williston.
<i>hessei</i>	François
<i>jactator</i>	spec. nov.
<i>holaspis</i>	Speiser
clavatus	Karsch <i>sensu</i> Enderlein, 1926
leptogaster	Loew <i>sensu</i> Enderlein
cuspidicauda	Enderlein
<i>rufifemur</i>	Enderlein
<i>leptogaster</i>	Loew
clavatus	Karsch
clavatus	Karsch <i>sensu</i> Enderlein, 1930
<i>daveyi</i>	spec. nov.

REFERENCES

ADAMS, C. F. 1905. African Diptera. *Kans. Univ. Sci. Bull.* **3** : 156.

ALLEN, J. D. and R. A. BULL 1954. Recent severe attacks on Oil Palms by two new caterpillar pests belonging to the Limacodidae. *J. W. Afr. Inst. Oil Palm Res.* **2** : 130-7.

BEZZI, M. 1905. Il genere *Systropus* Wied. nella fauna palearctica. *Redia* **2** : 262-79.

——— 1914. Ditteri raccolti del Prof. Silvestri durante il suo viaggio in Africa del 1912-1913. *Portici, Boll. Lab. zool. gen. Agr.* **8** : 279-308.

——— 1921. On the Bombyliid fauna of South Africa (Diptera) as represented in the South African Museum. *Ann. S. Afr. Mus.* **18** : 1-180.

——— 1924. The Bombyliidae of the Ethiopian Region. London, British Museum.

BOWDEN, J. 1962. Diptera Brachycera, Bombyliidae. Parc National de la Garamba, Mission H. de Saeger. Institut des Parcs Nationaux du Congo et Ruanda. **32**(3).

——— 1964. The Bombyliidae of Ghana. *Mem. ent. Soc. sth. Africa* **8** : 1-159.

CARCASSON, R. H. 1964. A preliminary survey of the zoogeography of African Butterflies. *E. Afr. Wildl. J.* **2** : 122-57.

CURRAN, C. H. 1927. Diptera of the American Museum Congo Expedition. Pt I, Bibionidae, Bombyliidae etc. *Bull. Am. Mus. nat. Hist.* **57** : 33-89.

ENDERLEIN, G. 1926. Zur Kenntnis der Bombyliiden Subfamilie Systropodinae (Diptera). *Wien. ent. Ztg.* **43** : 69-92.

——— 1930. Dipterologische Studien XX. *Dt. ent. Z.* : 65-71.

FRANÇOIS, F. 1954. Contribution a l'étude des Diptères de l'Urundi. V. Description d'un *Systropus* nouveau (Bombyliidae). *Inst. roy. Sci. nat. Belg.* **30** : 1-4.

KARSCH, F. 1880. Die Spaltung der Dipteren-Gattung *Systropus* Wiedemann. *Z. gesam. Naturw.* **53** : 654-8.

KERTESZ, J. 1909. Catalogus Dipterorum, vol. 5. Budapest.

LOEW, H. 1860. Die Dipterenfauna Sudafrika's. Berlin.

MACQUART, J. 1840. Diptères exotiques nouveaux ou peu connues. Vol. II, pt I. *Mem. Soc. Sci. Lille et Paris*, Roret.

PAINTER R. H. and E. M. PAINTER, 1963. A Review of the Subfamily Systropinae (Diptera-Bombyliidae) in North America. *J. Kans. ent. Soc.* **36** : 278-348.

SCHINER, J. S. 1868. Reise der oesterr. Fregatte Novara um die Erde etc. Zool. Theil b. 2 (1 : B : 1) (Diptera) : 3-388.

SÉGUY, E. 1934. Diptères d'Afrique. *Encycl. Ent.*, Ser B. II, Dipt. : 63-80.

SEYDEN, C. 1934. Note biologique sur *Parasa urda* et *Systropus marshalli*. *Rev. Zool. Bot. afr.* **26** : 26.

SPEISER, P. 1910. Diptera Orthorhapha in: Sjostedt's Zool. Kilimanjaro-Meru Exp., 1905-1906. *Königl. Schwed. Akad. der Wissensch. Bd. II Abt.* **10** : 31-112.

——— 1914. Beiträge zur Dipteren-fauna von Kamerun II. *Z. Deutsch. ent. Ges.* : 1-16.

WALKER, F. 1849. List Diptera, Pt IV. London, British Museum.

WANDOLLECK, B. 1897. Die Dipterengattungen *Systropus* Wiedem. und *Cephenus* Latr. *Ent. Nachr.* **13** : 198-9.

WESTWOOD, J. O. 1876. Notae Dipterologicae. *Trans. R. ent. Soc. Lond.* **4** : 571-9.

WIEDEMANN, C. R. W. 1820. Nova dipterorum genera iconibus illustratae. Kiliae, Mohr.

——— 1828-1830. Auszereuropäische zweiflügelige Insekten, I-II.

WILLISTON, S. W. 1901. Biologia Centrali Americana, Diptera. Vol. I, Suppl. : 249-332.

ZIMSEN, E. 1954. The Insect types of C. R. W. Wiedemann in the Zoological Museum in Copenhagen. *Spolia zool. Mus. hau* **14** : 1-43.